DOCUMENT RESUME

ED 090 028 SE 017 598

TITLE	Metric Conversion Act of 1973. Hearing Before the Committee on Commerce, United States Senate, 93rd Congress, First Session on S. 100.
INSTITUTION	Congress of the U.S., Washington, D.C. Senate Committee on Commerce.
PUB DATE	2 Nov 73
NOTE	94p.
EDRS PRICE	MF-$0.75 HC-$4.20 PLUS POSTAGE
DESCRIPTORS	*Economic Factors; *Federal Legislation; Government Publications; Mathematics Education; *Measurement; *Metric System; Reference Materials; Standards

ABSTRACT

The complete text of the Senate bill to make the metric system the predominate system of measurement in the U.S. is given. Next follows testimony of witnesses: Senators, governmental agencies, representatives of labor unions and industries and the director of the National Bureau of Standards. Also included are some letters from other interested sources, including several educators. (LS)

METRIC CONVERSION ACT OF 1973

ED 090028

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

HEARING

BEFORE THE

COMMITTEE ON COMMERCE
UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

ON

S. 100

TO PROVIDE A NATIONAL PROGRAM IN ORDER TO MAKE THE INTERNATIONAL METRIC SYSTEM THE PREDOMINANT BUT NOT EXCLUSIVE SYSTEM OF MEASUREMENT IN THE UNITED STATES AND TO PROVIDE FOR CONVERTING TO THE GENERAL USE OF SUCH SYSTEM WITHIN TEN YEARS

NOVEMBER 2, 1973

Serial No. 93-50

Printed for the use of the Committee on Commerce

U.S. GOVERNMENT PRINTING OFFICE
27-065 WASHINGTON : 1974

COMMITTEE ON COMMERCE

WARREN G. MAGNUSON, Washington, *Chairman*

JOHN O. PASTORE, Rhode Island
VANCE HARTKE, Indiana
PHILIP A. HART, Michigan
HOWARD W. CANNON, Nevada
RUSSELL B. LONG, Louisiana
FRANK E. MOSS, Utah
ERNEST F. HOLLINGS, South Carolina
DANIEL K. INOUYE, Hawaii
JOHN V. TUNNEY, California
ADLAI E. STEVENSON III, Illinois

NORRIS COTTON, New Hampshire
JAMES B. PEARSON, Kansas
ROBERT P. GRIFFIN, Michigan
HOWARD H. BAKER, Jr., Tennessee
MARLOW W. COOK, Kentucky
TED STEVENS, Alaska
J. GLENN BEALL, Jr., Maryland

FREDERICK J. LORDAN, *Staff Director*
MICHAEL PERTSCHUK, *Chief Counsel*
ERIC H. M. LEE, *Staff Counsel*
ARTHUR PANKOPF, Jr., *Minority Staff Director*
DAVID A. CLANTON, *Minority Staff Counsel*

CONTENTS

	Page
Text of S. 100	2
Agency comments:	
General Services Administration	23
Comptroller General	23
Department of the Air Force	25
Department of State	26
Department of Commerce	26

LIST OF WITNESSES

Curtis, Hon. Carl T., U.S. Senator from Nebraska	27
Pell, Hon. Claiborne, U.S. Senator from Rhode Island	28
Peterson, Ken, legislative representative, AFL–CIO; accompanied by Markley Roberts, economists; Tom Hannigan, assistant to the international secretary of the International Brotherhood of Electrical Workers; and Albert Epstein, director of research, International Association of Machinists	42
Prepared statement	47
Questions of the committee and Mr. Hannigan's answers	63
Questions of the committee and Mr. Peterson's answers	65
Questions of the committee and Mr. Epstein's answers	68
Roberts, Richard W., Director, National Bureau of Standards, Department of Commerce; accompanied by Jeffrey V. Odom, Metric Information Office	34
Questions of the committee and the answers thereto	38
Willford, Frederick, director, government affairs, National Federation of Independent Business; accompanied by John Motley	70
Prepared statement	72

ADDITIONAL ARTLICLES, LETTERS, AND STATEMENTS

Kroeze, Henry, P. E., chairman, University of Wisconsin Center, letter of November 20, 1973	83
McIntire, Clifford G., legislative director, American Farm Bureau Federation, letter of November 1, 1973	79
National Association of Manufacturers, statement	86
Sellers, Robert C., president, Robert C. Sellers & Associates, Inc., letter of November 12, 1973	79

METRIC CONVERSION ACT OF 1973

FRIDAY, NOVEMBER 2, 1973

U.S. SENATE,
COMMITTEE ON COMMERCE,
Washington, D.C.

The committee met at 9:35 a.m. in room 5110 Dirksen Senate Office Building, Hon. John O. Pastore, presiding.

Senator PASTORE. It is now 9:30. With two very busy Senators here, we shall get this thing started, and then Senator Stevens will take it over.

Gentlemen, you Senators may either sit here or there, depending on how you would like it. We shall hear Senator Curtis first.

[The bill and agency comments follow:]

Staff member assigned to this hearing: Eric Lee.

93D CONGRESS
1ST SESSION

S. 100

IN THE SENATE OF THE UNITED STATES

JANUARY 4, 1973

Mr. PELL (for himself and Mr. INOUYE) introduced the following bill; which was read twice and referred to the Committee on Commerce

A BILL

To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Metric Conversion Act of 1973".

FINDINGS

SEC. 2. The Congress finds that—

(1) the United States is the only industrially

developed nation which has not established a national policy committing itself to and facilitating conversion to the metric system; and

(2) as a result of the study to determine the advantages and disadvantages of increased use of the metric system in the United States authorized by Public Law 90–472 (82 Stat. 693), the Secretary of Commerce has found that increased use of the metric system in the United States is inevitable, and has concluded that a national program to achieve a metric changeover is desirable; that maximum efficiency will result and minimum costs to effect the conversion will be incurred if the conversion is carried out pursuant to a national plan; that the changeover period be ten years, at the end of which the Nation would be predominantly, although not exclusively, metric; that a central planning and coordinating body be established and assigned to plan and coordinate the changeover in cooperation with all sectors of our society; and that immediate attention be given to education of the public and to effective United States participation in international standards making;

(3) the adoption of the metric system would result in new jobs in the United States;

(4) the adoption of such system would enhance our position in world trade markets;

(5) the benefits of conversion would offset the costs of conversion;

(6) conversion to such system would be a stimulus to the economy and to new investment in plant equipment;

(7) the language and tools of our scientific community are already using such system;

(8) a common system of measurement would improve international communication;

(9) the Nation is already heading toward such system slowly and haphazardly;

(10) such system is based on fundamental relationships and is easily understood and would be an aid to our educational system;

(11) small businesses and self-employed craftsmen would benefit from a coordinated conversion program;

(12) new international standards are currently being developed into such system and the United States is not fully participating in such development;

(13) the use of the metric system of weights and measures in the United States was authorized by the Act of July 28, 1866 (14 Stat. 339);

(14) the United States was one of the original signatories to the Convention of the Meter (20 Stat. 709), which established the General Conference of

Weights and Measures, the International Committee of Weights and Measures, and the International Bureau of Weights and Measures; and

(15) the metric measurement standards recognized and developed by the International Bureau of Weights and Measures have been adopted as the fundamental measurement standards of the United States and the customary units of weights and measures used in the United States have been since 1893 based upon such metric measurement standards.

SEC. 3. (a) It is therefore declared that the policy of the United States shall be—

(1) to establish the metric system of measurement as the sole language of measurement in the United States within ten years from the date of the enactment of this Act except for exemptions granted pursuant to the provisions of this Act;

(2) as part of the plan establishing such system, to provide a method of appeal under which exemptions may be granted to persons and businesses upon proof of excessive costs substantially outweighing benefits to the Nation, custom and tradition as a member of a class outweighing such benefits, or other factors determined as part of such plan;

(3) to facilitate and encourage the substitution of

metric measurement units for customary measurement units in education, trade, commerce, and all other sectors of the economy of the United States with a view to making metric units the predominant, although not exclusive, language of measurement with respect to transactions occurring after ten years from the date of the enactment of this Act;

(4) to facilitate and encourage the development as rapidly as practicable of new or revised engineering standards based on metric measurement units in those specific fields or areas in the United States where such standards will result in rationalization or simplification of relationships, improvements of design, or increases in economy;

(5) to facilitate and encourage the retention in new metric language standards of those United States engineering designs, practices, and conventions that are internationally accepted or embody superior technology;

(6) to cooperate with foreign governments and public and private international organizations which are or become concerned with the encouragement and coordination of increased use of metric measurement units or engineering standards based on such units, or both, with a view to gaining international recognition for metric standards proposed by the United States;

(7) to assist the public through information and educational programs to become familiar with the meaning and applicability of metric terms and measures in daily life, including—

(A) public information programs conducted by the Board through the use of newspapers, magazines, radio, television, other media, and through talks before appropriate citizens groups and public organizations;

(B) counseling and consultation by the Secretary of Health, Education, and Welfare and the Director, National Science Foundation with educational associations and groups so as to assure that the metric system of measurement is made a part of the curriculum of the Nation's educational institutions and that teachers and other appropriate personnel are properly trained to teach the metric system of measurement;

(C) consultation by the Secretary of Commerce with the National Conference of Weights and Measures so as to assure that State and local weights and measures officials are appropriately informed of the intended metric changeover and are thus assisted in their efforts to bring about timely amendments to weights and measures laws; and

(D) such other public information programs by any Federal agency in support of this Act which relate to the mission of the agency;

(8) to accomplish a changeover to the greatest practical extent within ten years by Federal agencies to the metric system of measurement pursuant to the comprehensive plan developed by the Board; and

(9) to utilize Federal procurement activities to encourage the general use of the metric system of measurement.

(b) It is the purpose of this Act—

(1) to provide for the formulation and initial effectuation of a plan for conversion to the metric system;

(2) to establish a National Metric Conversion Board to develop and implement a metric conversion plan for the United States;

(3) to provide limited assistance to businesses and individuals, substantially effected by metric conversion, in bearing the cost of such conversion; and

(4) to provide for the establishment of a national information program about metric conversion.

DEFINITIONS

SEC. 4. For the purpose of this Act—

(a) The term "metric system of measurement" means the International System of Units as established by the

General Conference of Weights and Measures in 1960 and interpreted or modified for the United States by the Secretary of Commerce.

(b) The term "engineering standard" means a standard which prescribes a concise set of conditions and requirements to be satisfied by a material, product, process, procedure, convention, test method, and the physical, functional, performance and or conformance characteristics thereof.

(c) The term "changeover period" means the length of time for the United States to become predominantly, although not exclusively, metric.

ESTABLISHMENT OF NATIONAL METRIC CONVERSION BOARD

SEC. 5. There is hereby established a National Metric Conversion Board (herein referred to as the "Board") to implement the policy set out in this Act.

COMPOSITION OF BOARD

SEC. 6. The composition of the Board shall be as follows:

(a) Nine members shall be appointed by the President, with the advice and consent of the Senate, from among those persons with experience and competence in the following areas: business, labor, education, consumer protection, science, and technology. The President shall designate one member appointed by him to serve as Chairman. The mem-

bers first appointed under this section shall continue in office for terms of 1, 2, 3, 4, or 5 years, from the date this section takes effect, the term of each to be designated by the President at the time of nomination. Their successors shall be appointed each for a term of five years from the date of the expiration of the term which his predecessor was appointed. No more than five of the members shall be appointed from the same political party;

(b) One Member of the Senate shall be appointed by the President of the Senate; and

(c) One Member of the House of Representatives, who shall not be a member of the same political party as the Member of the Senate, shall be appointed by the Speaker of the House of Representatives.

VACANCIES AND VICE CHAIRMAN

SEC. 7. No vacancy on the Board shall impair the right of the remaining members to exercise all the powers of the Board. Six members of the Board shall constitute a quorum for the transaction of business. The Board shall annually elect a Vice Chairman to act in case of the absence or disability of the Chairman or in case of the vacancy in the Office of the Chairman.

PLAN

SEC. 8. (a) Within eighteen months after funds have been appropriated to carry out the provisions of this Act

the Board shall, in furtherance and in support of the policy expressed in section 3 of this Act, develop and submit to the President and the Congress a comprehensive plan to accomplish a changeover to the metric system of measurement in the United States. Such a plan may include recommendations for legislation deemed necessary and appropriate. Such a plan shall include proposed Executive orders or other directives, which the President is authorized to promulgate and make effective, requiring such conversion activities of the Federal Government, including procurement, in accordance with an appropriate time schedule and pursuant to the comprehensive plan. In developing this plan the Board shall—

(1) consult with and take into account the interests and views of the United States commerce and industry, including small business; science; engineering; labor; education; consumers; government agencies at the Federal, State, and local level; nationally recognized standards developing and coordinating organizations; and such other individuals or groups as are considered appropriate by the Board to carry out the purposes of this section;

(2) consult, to the extent deemed appropriate, with foreign governments, public international organizations and, through appropriate member organizations, private international standards organizations. Contact with foreign governments and intergovernmental organizations

shall be accomplished in consultation with the Department of State.

(b) Any amendment to the plan shall be submitted by the Board to the President and the Congress under the provisions set out in subsection (a) of this section and section 9 of this Act.

IMPLEMENTATION

SEC. 9. (a) The Board shall begin implementation of the plan at the end of the first period of sixty calendar days that Congress is in continuous session after the date on which the plan is transmitted to it and to the President unless between the date of transmittal and the end of the sixty-day period, either House passes a resolution stating in substance that it does not favor the plan or the President disapproves the plan and gives his reasons therefor.

(b) For the purpose of subsection (a) of this section—

(1) continuity of session is broken only by an adjournment of Congress sine die; and

(2) the days on which either House is not in session because of an adjournment of more than three days to a day certain are excluded in the computation of the sixty-day period.

POWERS

SEC. 10. In carrying out its duties, the Board is authorized to:

(a) enter into contracts in accordance with the Federal Property and Administrative Services Act of 1949, as amended, with Federal or State agencies, private firms, institutions, and individuals for the conduct of research or surveys, the preparation of reports, and other activities necessary to the discharge of its duties;

(b) conduct hearings at such times and places as it deems appropriate;

(c) establish such committees and advisory panels as it deems necessary to work with the various sectors of the American economy and governmental agencies in the development and implementation of detailed changeover plans for those sectors; and

(d) perform such other acts as may be necessary to carry out the duties prescribed by this Act.

COMPENSATION OF BOARD

SEC. 11. Members of the Board who are not in the regular full-time employ of the United States shall, while attending meetings or conferences of the Board or otherwise engaged in the business of the Board, be entitled to receive compensation at a rate of $100 per day, including traveltime, and, while so serving on the business of the Board away from their homes or regular places of business, they may be al-

27-065 O - 74 - 3

lowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code, for persons employed intermittently in the Government service. Payments under this section shall not render members of the Board employees or officials of the United States for any purpose.

DIRECTOR AND CONSULTANTS

SEC. 12. (a) The Board is authorized to appoint an Executive Director who shall serve full time and receive basic pay at a rate not to exceed the rate provided for GS–18 in section 5332 of title 5, United States Code, and to appoint and fix the compensation of such staff personnel as may be necessary to carry out the provisions of this Act.

(b) The Board is authorized to employ experts and consultants or organizations thereof as authorized by section 3109 of title 5, United States Code, compensate individuals so employed at rates not in excess of the rate prescribed for grade 18 of the General Schedule under section 5332 of such title, including traveltime, and allow them, while away from their homes or regular places of business, travel expenses (including per diem in lieu of subsistence) as authorized by section 5703 of said title 5 for persons in the Government service employed: *Provided, however,* That contracts for such employment may be renewed annually.

STAFF SERVICES

SEC. 13. Financial and administrative services (including those related to budgeting, accounting, financial reporting, personnel, and procurement) and such other staff services as may be requested by the Board shall be provided the Board by the Secretary of Commerce, for which payment shall be made in advance, or by reimbursement, from funds of the Board in such amounts as may be agreed upon by the Chairman of the Board and the Secretary of Commerce. In performing these functions for the Board, the Secretary is authorized to obtain such information and assistance from other Federal agencies as may be necessary.

GIFTS

SEC. 14. (a) The Board is hereby authorized to accept, hold, administer, and utilize gifts, donations, and bequests of property, both real and personal, and personal services, for the purpose of aiding or facilitating the work of the Board. Gifts and bequests of money and the proceeds from sales of other property received as gifts or bequests shall be deposited in the Treasury in a separate fund and shall be disbursed upon order of the Board.

(b) For the purpose of Federal income, estate, and gift taxes, property accepted under subsection (a) of this section shall be considered as a gift or bequest to or for the use of the United States.

(c) Upon the request of the Board, the Secretary of the

Treasury may invest and reinvest in securities of the United States any moneys contained in the fund herein authorized. Income accruing from such securities, and from any other property accepted to the credit of the fund authorized herein, shall be disbursed upon the order of the Board.

ANNUAL REPORT

SEC. 15. The Board shall submit annual reports of its activities to the President and the Congress with respect to (1) progress being made under such plans; (2) tangible costs and benefits being incurred thereunder; and (3) any additional legislation needed to carry out the policy stated in this Act.

AUTHORIZATION

SEC. 16. There are hereby authorized to be appropriated, for the preceding sections, not to exceed $3,000,000 for the fiscal year beginning July 1, 1973, not to exceed $4,000,000 for the fiscal year beginning July 1, 1974, and for each of the following three fiscal years not to exceed $4,500,000. Appropriations to carry out those provisions may remain available for obligation and expenditure for such period or periods as may be specified in the Acts making such appropriations.

TAX ASSISTANCE

SEC. 17. (a) Section 167 of the Internal Revenue Code of 1954 (relating to depreciation) is amended by

redesignating subsection (m) as (n) and by inserting after subsection (l) the following new subsection:

"(n) PROPERTY NECESSARY FOR METRIC CONVERSION.—

"(1) USEFUL LIFE.—At the election of the taxpayer, the useful life of property described in paragraph (2) shall, for purposes of this section other than for purposes of subsection (c), be one-half of the useful life determined without regard to this subsection.

"(2) PROPERTY TO WHICH APPLICABLE.—Paragraph (1) shall apply only to personal property which is—

"(A) manufactured in the United States and substantially all of the component parts of which are manufactured in the United States, and

"(B) placed in service in replacement of other property in order to carry out the requirements of the national plan for metric conversion submitted under the Metric Conversion Act of 1971.

"(3) ELECTION.—An election under paragraph (1) with respect to any property shall be made at such time and in such manner as the Secretary or his delegate prescribes by regulations.

"(4) REGULATIONS.—The Secretary or his delegate shall, after consultation with the Secretary of Com-

merce, prescribe regulations to carry out the purposes of this subsection."

(o) As soon as practicable after the submission of the national plan for metric conversion under this Act the Secretary of the Treasury shall submit to the Congress recommendations for additional changes in the Federal income tax laws which he considers necessary to assist in carrying out the national plan. Before submitting recommendations under this subsection the Secretary of the Treasury shall consult with the Secretary of Commerce and the Secretary of Labor, and with such other officers of the United States and such private individuals and organizations as he deems desirable.

CONVERSION ASSISTANCE TO BUSINESS AND INDIVIDUALS

SEC. 18. (a) Section 7(b) of the Small Business Act is amended by adding after paragraph (7) a new paragraph as follows:

"(8) to make such loans (either directly or in cooperation with banks or other lending institutions through agreements to participate on an immediate or deferred basis) as the Administration, in consultation with the Secretary of Commerce, determines to be necessary or appropriate to assist any business concern to make changes in its equipment, facilities, or methods of operation to conform to the national plan of metric conversion submitted under the Metric Con-

version Act of 1973, if the Administration determines that such concern is likely to suffer substantial economic injury without assistance under this paragraph."

(b) (1) The Administrator of the Small Business Administration is authorized, under terms and conditions prescribed by him, to make grants to individuals to defray non-reimbursable expenses which must be incurred by them for the purpose of acquiring tools or instruments which are necessary to their continued employment in a trade or business and are required as the result of the implementation of the national plan of metric conversion submitted under the Metric Conversion Act of 1973. The amount of any such grant to any individual shall not exceed $2,000.

(2) There are authorized to be appropriated to the Small Business Administration such sums as may be necessary to carry out this subsection.

PUBLIC INFORMATION PROGRAMS

SEC. 19. (a) The Commissioner of Education, in consultation with the Secretary of Commerce, shall make grants to, and contracts with, institutions of higher education, State and local educational agencies, and other public and private nonprofit agencies, organizations, and institutions to develop and carry out programs of public education necessary to carry out the policy stated in section 3 (a) of this Act.

(b) Financial assistance under this section may be made available only upon application to the Commissioner. Any such application shall be submitted at such time, in such form, and containing such information as the Commissioner shall prescribe by regulation and shall be approved only if it—

(1) provides that the activities and services for which assistance is sought will be administered by, or under the supervision of, the applicant;

(2) describes a program which holds promise of making a substantial contribution toward attaining the purposes of this section;

(3) sets forth such policies and procedures as will insure adequate evaluation of the activities intended to be carried out under the application;

(4) sets forth policies and procedures which assure that Federal funds made available under this section for any fiscal year will be so used as to supplement and, to the extent practical, increase the level of funds that would, in the absence of such Federal funds, be made available by the applicant for the purposes described in this section, and in no case supplant such funds;

(5) provides for such fiscal control and fund accounting procedures as may be necessary to assure

proper disbursement of and accounting for Federal funds paid to the applicant under this section; and

(6) provides for making an annual report and such other reports, in such form and containing such information, as the Commissioner may reasonably require and for keeping such records, and for affording such access thereto as the Commissioner may find necessary to assure the correctness and verification of such reports.

(c) Applications from local education agencies for financial assistance under this section may be approved by the Commissioner only if the State educational agency has been notified of the application and been given the opportunity to offer recommendations.

(d) Amendments of applications shall, except as the Commissioner may otherwise provide by or pursuant to regulation, be subject to approval in the same manner as original applications.

(e) Federal assistance to any program or project under this section shall not exceed 60 per centum of the cost of such program or project, including costs of administration, unless the Commissioner determines, pursuant to regulations establishing objective criteria for such determinations, that assistance in excess of such percentage is required in furtherance of the purposes of this section.

27-065 O - 74 - 4

(f) There are authorized to be appropriated such amounts as may be necessary to carry out the provisions of this section.

(g) Any agency or organization which receives assistance under this section shall make available to the Commissioner of Education and the Comptroller General of the United States, or any of their duly authorized representatives, for purposes of audit and examination, any books, documents, papers and records that are pertinent to the assistance received by such agency or organization under this section.

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., April 17, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: Your letter of January 29, 1973, requested the views of the General Services Administration on S. 100, 93rd Congress, a bill "To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years."

It is the stated purpose of the bill to provide for the formulation and initial effectuation of a plan for conversion to the metric system; to establish a National Metric Conversion Board to develop and implement a metric conversion plan for the United States; to provide limited assistance to businesses and individuals, substantially affected by metric conversion, in bearing the cost of such conversion; and to provide for the establishment of a national information program about metric conversion.

Within 18 months the Board would submit its plan to the President and the Congress, and would begin implementation of the plan unless the President disapproved it or either House passed a resolution of disapproval within 60 calendar days of continuous session.

GSA endorses the concept of metrication as consistent with sound management principles and essential to remaining competitive in international commerce. However, we defer to the Department of Commerce as to the exact form which a metric conversion bill should take.

We estimate that the cost to GSA would be approximately $1 million during the transition period, and that if the conversion included metric based engineering standards as well as metric measurement units, an annual cost of $100,000 for an indefinite period after the transition period, due to the need for dual inventories of replacement parts and equipment.

The Office of Management and Budget has advised that there is no objection to the submission of this report to your Committee, and that enactment of the draft bill proposed by the Department of Commerce and referred to your Committee on March 19, 1973, in lieu of S. 100 would be consistent with the Administration's objectives.

Sincerely,

ALLAN G. KAUPINEN, *Assistant Administrator.*

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., May 2, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: By letter dated January 30, 1973, you requested our comments on S. 100, 93d Congress, a bill which, if enacted, would be cited as the "Metric Conversion Act of 1973."

We note that section 15 of the bill requires that the proposed National Metric Conversion Board submit annual reports of its activities to the President and the Congress. It is suggested that the time for submission of the report should be stated. For example, the report could be submitted annually, not later than March 31. Further, we feel that the statements to be included in the report concerning tangible costs and benefits being incurred under the plan should be accompanied by a listing identifying the principal analyses and studies supporting those statements.

We are enclosing our Report to Congressman H. R. Gross (B-140339, March 27, 1973) which the Committee may find useful.

Enclosed for your consideration are some technical and editorial changes which we believe should be considered by the Committee.

Sincerely yours,

PAUL G. DEMBLING,
(For the Comptroller General of the United States).

Enclosures.

Technical and editorial changes to S. 100, 93d Congress

On page 6, line 22, a comma should be inserted before "with."

On page 11, line 11, a comma should be inserted after "unless."

On page 16, line 19, "1971" should be "1973."

On page 17, line 10, the comma should be deleted.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., March 27, 1973.

Hon. H. R. GROSS,
House of Representatives,
Washington, D.C.

DEAR MR. GROSS: On October 17, 1972, you requested the General Accounting Office to evaluate the Department of Commerce U.S. Metric Study (Study) report to Congress. Our evaluation is not completed but, as agreed with your office, we are reporting on matters noted to date which may be of use in the current congressional consideration of proposed legislation to adopt the metric system for use in the United States.

Public Law 90-472 authorized the Secretary of Commerce to conduct a program of investigation, research, and survey to determine the impact on the United States of increasing worldwide use of the metric measurement system. The ensuing Study covered such areas as international trade, manufacturing industry, international standards, defense, and a history of the metric controversy in the United States. The results were published in July 1971.

The Study includes the Secretary's finding that increased metric usage is in the best interests of the United States and his recommendation that the Nation change to the metric system through a 10-year coordinated national program at the end of which the Nation will be predominantly metric.

EFFECT ON INTERNATIONAL TRADE AND DOMESTIC ECONOMY

The Study states that had the United States been metric by 1970, in 1975 its exports of measurement standard sensitive products would have been increased by $600 million and that there would have been no difference in imports of such products. This statement was based on surveys of importers and exporters. Our examination of the survey of importers, however, showed that imports of measurement standard sensitive products would have been increased by $100 million. We believe that this substantial offset to the favorable export benefit should have been recognized in the Study.

We also noted that the Study did not discuss the possibility that costs of converting the U.S. manufacturing industry to the metric system would tend to increase costs and prices of its products and thus place these products at even more of a competitive disadvantage vis-a-vis the products of foreign firms that are already metric.

NATIONAL CONVERSION PROGRAM MORE COSTLY

The Study concluded that the Nation was already on the way to becoming metric and that the question was whether the change should be made under a planned national program or without a plan.

The Study included a comparative analysis of the costs to change to metric by the manufacturing industry sector. The analysis considered two alternatives; a 10-year planned national changeover and a 50-year no-plan national changeover, and made a comparison at three assumed base cost levels—$10, $25, and $40 billion. The analysis showed that, regardless of the cost assumptions, the 10-year planned changeover was the preferred alternative because it would be less costly and the benefits of metric usage would be realized sooner than under the 50-year no-plan changeover.

Although we have not evaluated all the data used in the calculations, we do take issue with the omission of a factor (interest) representing the time value of money.

We applied the present-value method to the Study's manufacturing industry analysis. This is the method most often used to evaluate alternatives that differ in the timing of cash flows.

A major problem in the use of the present-value method has been the selection of the appropriate interest rate. Arguments have been presented for rates ranging from as low as the interest rate for borrowing by the Treasury to as high as certain rates of return that can be earned in the private sector of the economy. In our computation we used the 10-percent interest rate prescribed by the Office of Management and Budget, in OMB Circular No. A–94, Revised, dated March 27, 1972.

Our computation showed that if the time value of money had been set at 10 percent, the analysis would have shown that:

1. At the $10 billion level the 10-year planned changeover alternative would be less costly than the 50-year no-plan changeover—as shown by the Study; and
2. At the $25 and $40 billion levels, the 10-year planned changeover would be more costly than the 50-year no-plan changeover—contrary to what was shown by the Study.

It should be noted that the costs used in the Study's analysis were assumed for the purpose of comparing the 10-year planned changeover and the 50-year no-plan changeover. Elsewhere in the Study it is stated that an initial estimate of the manufacturing industry's changeover costs was $25 billion which after various modifications was changed to a final estimate ranging from $6.2 to $14.3 billion.

IMPACT OF METRICATION ON SMALL BUSINESS

Public Law 90–472 directed that the Study give full consideration to the advantages, disadvantages, and problems associated with the Nation's changeover to the metric system, and recommend specific means of aiding those areas of the economy where metrication would entail significant costs. One such area was small business.

In a March 1972 report, the House Subcommittee on Minority Small Business Enterprise of the Select Committee on Small Business stated that the Study did not fulfill the intent of the Congress with respect to small business. The Subcommittee report noted that the Study did not inquire directly into the impact of metrication on the small business sector and that the Study's small business recommendations were based on (1) a statement of one small business association, (2) opinions of three officials of the Small Business Administration, and (3) surveys of manufacturing and non-manufacturing firms most of which were not small business.

We do not plan to distribute this report further unless you approve or publicly announce its contents.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

DEPARTMENT OF THE AIR FORCE,
Washington, D.C., May 8, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for the views of the Department of Defense with respect to S. 100, 93rd Congress, a bill "To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years." The Secretary of Defense has assigned to the Department of the Air Force the responsibility for expressing the views of the Department of Defense.

The purpose of S. 100 is as stated in the title.

The Department of the Air Force, as the executive agent for metrication, in conjunction with the DOD Metric Steering Committee, and on behalf of the Department of Defense, has no objection to the stated purpose of the bill. It is important to understand that conversion will have an impact on budget and operational considerations within the Department of Defense. This is particularly noteworthy during the current period of fiscal constraints when the limited funds available must be applied to the most urgent needs of national security.

The Secretary of Commerce, on behalf of the Administration, has submitted a draft of proposed legislation to the Congress which would, if enacted, establish a national policy relating to conversion to the metric system in the United States. The proposal has been referred to your Committee.

The Department of the Air Force, on behalf of the Department of Defense, supports the legislation proposed by the Department of Commerce and favors its enactment in lieu of S. 100.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Office of Management and Budget advises that, from the standpoint of the Administration's program, there is no objection to the presentation of this report for the consideration of the Committee.

GRANT L. HANSEN,
Assistant Secretary, Research and Development.

DEPARTMENT OF STATE,
Washington, D.C., August 10, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR SENATOR MAGNUSON: This is in reply to your letter of January 30, 1973, requesting the comments from the Department of State on S. 100, a bill, otherwise known as the "Metric Conversion Act of 1973."

The Department of State supports the concept of metric conversion as consistent with sound management principles and essential to meeting our international commercial competition. However, after a careful study of the question of Federal assistance, the Administration has concluded that maximum efficiency will result and minimum costs to effect the conversion will be incurred if the conversion is carried out in general without Federal subsidies.

Largely for this reason, the Department favors the enactment of legislation such as H.R. 5749.

The Office of Management and Budget advises that there is no objection to the submission of this report and that enactment of H.R. 5749 would be consistent with Administration objectives.

Sincerely yours,

MARSHAL WRIGHT,
Assistant Secretary for Congressional Relations.

GENERAL COUNSEL OF THE DEPARTMENT OF COMMERCE,
Washington, D.C., October 5, 1973.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in reply to your request for the views of this Department with respect to Working Draft No. 1 (S. 100), a bill "To provide a national program in order to make the international metric system the predominant but not exclusive system of measurement in the United States and to provide for converting to the general use of such system within ten years."

This bill would establish a national policy to facilitate the transition to the metric system of weights and measures in the United States. To bring about such transition, the bill creates an 11 member National Metric Conversion Board which would have the responsibility to formulate within 18 months a comprehensive national plan to make the metric system the predominant but not exclusive system of weights and measures in the United States within ten years.

We are pleased to note that the Working Draft incorporates in large measure H.R. 5749, a bill which was introduced in this Congress at the request of the Secretary of Commerce to establish a national policy relating to conversion to the metric system in the United States.

It is noted that Section 8(a) of the bill provides that the Board would simultaneously submit its report to the President and to the Congress. We would have preferred that the Board submit its report to the President and that he transmit it to the Congress with his views. Such a statement of the President's views would, we believe, be of assistance to the Congress in any action it might taken on the Board's plans under Section 9 of the bill.

Otherwise the bill, in our judgment, represents an appropriate response to the conclusion reached in the U.S. Metric Study that eventually the United States will adopt use of the metric system of measurement and by so doing will join all the other industrialized nations of the world who are already using such system or are in the process of converting to it. It may be recalled that the final report of the Study was submitted to the Congress in July 1971 pursuant to Public Law 90–472, dated August 9, 1968 (82 Stat. 693), which directed the Secretary of Commerce to undertake a three year study to determine the impact of increasing worldwide use of the metric system on the United States.

In sum, except for our comment expressed above on Section 8(a), this Department supports fully Working Draft No. 1 (S. 100), the Metric Conversion Act of 1973, and urges its enactment.

Sincerely,

KARL E. BAKKE, *General Counsel.*

STATEMENT OF HON. CARL T. CURTIS, U.S. SENATOR FROM NEBRASKA

Senator CURTIS. Thank you, Mr. Chairman.

Mr. Chairman, I am not here to engage in a technical discussion on the merits of the metric system. I am here to suggest that this is an inopportunte time to advance this legislation.

Certainly all would agree that a sweeping change of this kind should not go through as a minor or unimportant matter. It should be debated thoroughly on the floor of the Senate after due notice is given to the country as to what is taking place. Then, there should be a rollcall to determine the will of the Senate.

The reason I am saying this is that this legislation passed the House of Representatives with practically no discussion. It is entirely possible that the country could be taken by surprise by it. I am not sure of the number of the bill that passed the House, but legislation relating to this subject.

If a changeover is required to the metric system, that can be brought about in some areas of activities with little inconvenience or trouble. There are other areas where the situation is more complex and difficult. I might mention those problems in reference to the description of real estate in deeds, mortgages, and other evidences of ownership. To change away from feet, rods, acres and sections will not be easy. Many parcels of real estate both in urban and rural areas are described by leaps and bounds and, here again, there will be problems.

I said this was not an opportune time to advance this legislation. My reason for saying this is that the people back home have had just about all the Government regulations thrust upon them that they can stand. In addition to all of the redtape and regulations that we must live by concerning most activities and government, we have such additional things as the Occupational Safety and Health Act and all the environmental requirements. I could go on and name a long list.

Let us give the people a break. Let us give them a breathing spell from the requirements imposed by an overlarge Government that is out of touch with the people back home.

Mr. Chairman, I appreciate the opportunity of appearing.

Senator PASTORE. Thank you very much.

Now, we will hear from Senator Pell.

STATEMENT OF HON. CLAIBORNE PELL, U.S. SENATOR FROM RHODE ISLAND

Senator PELL. Thank you very much, Mr. Chairman, my senior colleague, and Senator Stevens.

I am indeed pleased to have the opportunity of presenting my views on S. 100.

At the outset, I would like to express my admiration for the outstanding work done by the distinguished chairman of the Subcommittee on Foreign Commerce and Tourism, Senator Inouye, to bring this legislation toward fruition. Thanks greatly to his efforts, the Senate, for the first time in our history, passed a metric conversion act on August 18, 1972. And thanks to his help and guidance and yours, Mr. Chairman, we once again in the Senate appear on the threshhold of similar beneficial action.

This time, as contrasted with the past 92d Congress, the House of Representatives has moved forward with comprehensive hearings, with deliberations in subcommittee and full committee, and we may very soon see the House take up this matter on the floor.

I believe at long last we may soon see enacted an orderly and well-planned conversion program, and it would be my hope that this will happen if not in the concluding days of this first session of the 93d Congress, then early next year.

My own involvement in this legislation and its development dates back 10 years.

Ten years ago, I introduced a bill to permit the National Bureau of Standards to undertake a study leading to our metric conversion and exploring its possibilities. And 8 years ago, in 1965, I introduced a similar bill giving the Department of Commerce responsibility for the study. These proposals did not receive favorable action, but I believe they helped engender a certain, favorable momentum.

It was not until July of 1968, that the Congress passed the metric study proposal, legislation with which I was, once again, deeply involved.

This most comprehensive study was completed in July of 1971. It gave great encouragement to me to pursue my own concepts in further legislation, and it formed a solid base for the Senate hearings conducted by the Committee on Commerce during the 92d Congress. As I have mentioned on August 18 of last year, the Senate passed my amended bill.

In the 92d Congress, the House did not act on this legislation, but they have now followed the initiatives taken by the Senate, and I would like to pay tribute to the chairman of the House Subcommittee on Science, Research, and Development, Congressman John W. Davis, for his leadership, and also to the former chairman, George P. Miller, whose pioneering work over many years in these matters is deeply appreciated.

In January of this year, I introduced S. 100 with the cosponsorship of Senator Inouye. As now amended by committee action, S. 100 is similar to my amended bill which the Senate passed last August.

Certain features of S. 100, as introduced, have been changed and omitted, features which I believe were of value, and in keeping with my earlier involvement in this legislation's historic progress.

One provides, under section 3 of S. 100 as introduced, for an appeals process whereby exemptions from metric conversion could be granted to persons and businesses upon proof of excessive costs outweighing benefits to the Nation.

Another provides, under section 17 of my original bill submitted to this Congress, for assistance in the form of accelerated tax deprecitaion for businesses changing from equipment now in use to new metric machinery.

And a third provides for Small Business Administration grants of up to $2,000 to individuals for the purpose of enabling them to acquire tools and instruments necessary to their employment and required as the result of the implementation of a national metric conversion program.

In this respect, I note that the legislative representatives of the International Association of Machinists and Aerospace Workers submitted for the record of the House hearings of this year material indicating costs borne by individual workers in the purchase of their own tools. Over 100 different categories of tools are mentioned and priced, and a total of $3,235.30 is mentioned. Other estimates for individual workers who would need to purchase metric tools on their own are considerably less, ranging down the scale to a low figure of $300.

This issue, however, is one well worth considering in these deliberations. This legislation should not impose hardships on individual workers whose jobs depend on the self-purchase of the tools they use.

At the same time, Mr. Chairman, we should consider how these three features—an appeals process, tax assistance, and aid to individual workers—relate in concept to the now amended committee bill which bears the same fortuitous metric number, S. 100, and which is presently the same as we passed in the Senate last year.

Senator PASTORE. May I interrupt you for a question, Mr. Pell?

Senator PELL. Certainly.

Senator PASTORE. Great Britain converted to the metric system, did it not?

Senator PELL. Correct.

Senator PASTORE. How long ago?

Senator PELL. It started the movement in the mid-60's and should have completed it by the mid-70's.

Senator PASTORE. Are you familiar with the incentives they gave to their own workers and manufacturers?

Senator PELL. My recollection is they gave no incentives——

Senator PASTORE. No incentives whatsoever?

Senator PELL [continuing]. But let the cost fall where it may. I followed it quite closely because I had a relative who is the chairman of the English metrication board. And I met him in a radio program in Rhode Island on this subject, and also his successor. And that was the policy they have followed.

27-065 O - 74 - 5

Senator PASTORE. Do you feel, in this particular instance, we must add some kinds of incentives in order to convert effectively, even on a gradual basis?

Senator PELL. Not so much incentives; I do not think we need incentives.

Senator PASTORE. The incentives would be your tax reductions and these grants under the Small Business Administration. This is what I am talking about. I do not mean persuasion but rather money.

Senator PELL. I think of these provisions not so much as incentives because the incentives will come with indictment of the legislation, but as a means of ameliorating possible burdens on some of the small businesses and the workingmen involved in the conversion process.

In Britain, Australia, and Canada, my understanding is that they have not had this encouragement, but by the same token, the companies involved have perhaps carried more of the cost than would otherwise be the case here with the individual machinists.

Senator PASTORE. I remember that sometime ago Werner von Braun, who is a very dear friend of mine and one of the greatest scientists of our time, in a casual conversation in my office—he just dropped in for a social visit—remarked to me that the scientific community in America is shouldered with a great responsibility in the development of technology that works under the metric system, and then it has to convert it back to our system.

He thought that this was a waste of time and that the time had come when we ought to give very serious consideration to converting to the metric system in order to match competition in the world.

Senator PELL. Actually, one of the reasons why the automobile industry which originally opposed the metric system foursquare, changed their attitude was because Henry Ford was manufacturing a car in Great Britain called an "Anglia" and it was a failure. It did not sell.

One of the problems was the question of the standards used and of going back and forth from metric to the then English system. And that made him realize that if we are going to export our cars, we ought to be able to manufacture them according to the metric system. So he broke the line. Detroit put out a large pamphlet showing metric advantages. With withdrawal of the operations from Detroit, one finds that this idea moved ahead on its own.

Senator PASTORE. Would you care to comment on education in our secondary schools and our colleges? At some point, we will have to begin to educate young Americans very early in their schooling about the metric system as against the other system.

Senator PELL. That is absolutely true. I spent several years at school in Great Britain when I was a child, and it was the most complicated way of learning you could imagine with different factors such as pounds, farthings, hundredweights, stones, et cetera, even more complex than our own.

In the United States, in California, they have already started metric education in their schools. And they have made the decision and are actually going that way now.

In our own State of Rhode Island, Mr. Chairman, the city of Newport is already moving into metric education for its children.

Senator PASTORE. California has undertaken it, I suppose other States can do as well.

Senator PELL. As California.

Senator PASTORE. And Newport. Did you have anything to do with this in Newport?

Senator PELL. No.

Senator PASTORE. Do you live in Newport?

Senator PELL. Yes; but it is just one of those happy coincidences. But I do believe that these measures I am talking about, particularly the aid to the individual workers, would not be very expensive and would really relieve the burden on the individual workers, would not be very expensive and would really relieve the burden on the individual machinst himself who has to purchase his own tools.

My original bill stipulated that the National Metric Conversion Board, to be created under the legislation, would have no compulsory powers unless otherwise provided for by the Congress. In my initial proposal to the 93d Congress, I deleted this provision for I felt that the Board should have all appropriate authority: I wished to strengthen the Board's position insofar as possible.

I have studied these matters in other nations which are now in the process of conversion, and they find cooperation is the cornerstone of success.

I believe we could reach our ultimate goal of full conversion more rapidly under the provisions of S. 100 as introduced, but of overriding importance is a well-conceived, well-coordinated program, a program which will give increasing impetus to our conversion and serve to obviate and remove a haphazard conversion approach.

Increasingly, we are seeing segments of industry in our country either converting to the metric system or planning such conversion. It would be the responsibility of the National Metric Conversion Board to give these endeavors focus and growing purpose.

Indeed, and regardless of how we proceed legislatively, the role of this board will be crucial. Its members should be selected with the greatest care to reflect opinions and enlist cooperative support in such major fields as business, labor, education, consumer protection, science, and technology.

I highly commend the work of this committee and its leadership, and I look forward to the benefits which will come from enactment of the best possible legislation we can achieve.

And in deference to the committee members, I would ask that the rest of my statement be included in the record.

Senator PASTORE. I want to congratulate you. You have been a spearhead in the metric movement. I guess there are other people who have been interested in it, but from my own knowledge, you have been in the forefront.

The one thing that most impresses me about your position is the fact you do not expect this to be done overnight. You realize there are certain basic problems involved here that have to be resolved. This is not going to be an easy thing to do. Conversion is not going to be an easy thing to sell, but eventually, we must. We are the most industrialized nation in the world, and we are beginning to realize more and more that we are losing ground in international markets.

We have gone through that experience, and the competition abroad is keen. And the question we face is how to reach the high level of technology and competition necessary to achieve a better balance of trade. We must realize how much that means to our own economy, and I think we have to give matters like this very, very serious thought.

And I want to congratulate you.

Senator PELL. I thank you, sir. In our State, I recall in the early days, 10 years ago, almost no one supported metric conversion. The labor unions were opposed, and Brown & Sharp and industrial groups were very much opposed. As time has moved on, the opposition waned, although the machinists have justifiable concerns here. And the industrialists have markedly changed, so that Brown & Sharp, which as we both know is a substantial employer in our State, from having really opposed conversion 10 years ago have suddenly realized if we do go metric, they are going to be responsible for building the machines under the new system, and they are now very much for it.

It is quite interesting how they have changed their position.

Senator STEVENS. I was raised by an uncle who worked at Brown & Sharp, Senator Pell, and that sort of highlights my question which is, what we have is many, many small businesses in my State and even with the loans that are authorized here by the SBA, I am not certain that they could survive a transition if it were too rapid—what provisions do you have here that would protect the small businessman against such rapid conversion by the large businessmen that the small businessmen cannot survive?

Senator PELL. Some would suffer in the competition. A marginal one might go under. But there is a 10-year provision which I understand in the House is being stretched out to almost 12, and I cannot see in a 10- or 12-year period why that would be too short. Other countries are taking a shorter time.

Senator STEVENS. As I understand it, the gasoline station operator up on the Alaskan Highway is going to have to change all his wrenches as soon as Detroit decides to change the size of the bolts and the nuts and everything on their cars.

Now, if they do that precipitously, how does the small businessman handle it?

Senator PELL. If it is too precipitous, the small businessman would suffer. In the bill I introduced, there is some provisions that would help him. But in any big step forward, there will be some inconvenience. And our job is to try to make this inconvenience as little as possible, but the small businessman will have some problems.

Senator STEVENS. You do not think there is any room for any grants to assist the individuals that are really directly involved? What about the journeymen?

Senator PELL. They are covered in my bill, my proposal.

Senator STEVENS. On loans?

Senator PELL. No; on SBA grants of up to $2,000 so they can buy a new set of tools. That is provided for in my original bill and also from the viewpoint of the small businessman, there is the allowance for accelerated depreciation for business concerns.

Senator STEVENS. I do not want to belabor this, but what about small school districts that are just barely getting along these days and the formulas are constantly being changed so that they reflect a population

which we do not have, but we still have to have schools? Where are they going to get the funds to convert all their rulers to meters and all of their instruments to the metric system?

Senator PELL. I think the time factor is important. Two or three years is about the life of school books and other related equipment. I think you will find that the schools can convert quite readily.

Senator STEVENS. Are they not the ones that are going to do it overnight? It would not do any good to have a kid coming out of high school or grade school that learned the foot and standard measurements that we have today and have him go into a job market that is using the metric system.

Senator PELL. As I have said, 2 or 3 years is the life of an average schoolbook. If the school wants to convert more rapidly and is in prosperous enough condition to do so, fine, but if it is not, it will have to wait longer.

I know, again going back to my own city of Newport, we are starting to go in this direction right now.

Senator STEVENS. I notice Montgomery County is. My son has a ruler that has inches on the top and metric on the bottom, but I also know that out in the bush villages, they are lucky to have a ruler at all.

Senator PELL. They will be a bit more behind than would normally be the case. I imagine women's fashions are a little behind in the Alaskan bush country than in Montgomery County.

Senator STEVENS. I think the way they are going now, the Eskimos are ahead.

Senator PASTORE. The fact still remains that for some time students will have to be educated in both systems because the conversion period will cover 10 to 12 years. And in the meantime, they have to be knowledgeable in the present system until the new system takes over. I suppose it would have to be dual.

That is the reason I asked you about documenting what California has done. Let us put that in the record and see how they handle it because the point raised here by Senator Stevens is a very important one.

Senator PELL. A very valid one, indeed. And we will place in the record whatever helpful information we can gather together on this subject.

Senator PASTORE. Yes.

Thank you very much.

Senator PELL. Mr. Chairman, let me add that I look forward to early enactment of the legislation we are discussing.

When this happens we will no longer be the only industrial nation on earth which has not made its commitment to the metric system. We will be converting to a system far simpler, more logical, easier to learn and understand than the outmoded and outdated system we use at present. We will be assisting our country in its development of international trade and in correcting deficits in our balance-of-payments situation. We will be engendering greater opportunities for the impact of our own influence in the establishment of metric standards which will have international application.

It has been pointed out at our congressional hearings that most of the international standards required in all fields will be drafted and agreed to by 1983, and that if we stand by while other nations are

determining a complex roster of at least 10,000 metric industrial standards, then our own eventual conversion could well imply conversion to foreign industrial practice.

In that case we could abnegate a leadership role in world markets and thus lose opportunities for expansion of our own business interests.

If, instead, we are part and parcel of these international deliberations with our own official commitment having been made, then other nations will have to listen to our views and recommendations, just as we listen to theirs. The legislation we are considering recognizes these important international factors and the responsibility of the National Metric Conversion Board to facilitate our conversion in international areas as well as in all relevant domestic areas.

Finally, I believe we will be creating new opportunities here at home—for concerns both large and small. This legislation, I am convinced, can be beneficial to the small businessman, as well as to larger business entities, and I believe it will help create new jobs.

Let us move forward to gain these advantages at the earliest possible time.

Senator STEVENS [presiding]. The next witness is Dr. Richard W. Roberts, Director of the National Bureau of Standards, Department of Commerce, here in Washington.

You are accompanied by Jeffrey Odom of the Metric Information Office, is that correct?

STATEMENT OF RICHARD W. ROBERTS, DIRECTOR, NATIONAL BUREAU OF STANDARDS, DEPARTMENT OF COMMERCE; ACCOMPANIED BY JEFFREY V. ODOM, METRIC INFORMATION OFFICE

Dr. ROBERTS. That is correct.

Senator STEVENS. Proceed as you wish. And for your information and those who are here at the hearing, we have a full committee meeting going on on another subject, so I do not think there will be too many members here, but I hope you will help us make the record complete for this bill.

Dr. ROBERTS. Mr. Chairman, I appreciate the opportunity to give the views of the Department of Commerce on the matter of the replacement of worker-owned tools and equipment and the retaining of workers that may result from metric conversion, and additionally, on the impact of metrication on small business. We share your concern with the importance of these issues and welcome this additional discussion.

First, because it has been over 2 years since the report of the U.S. metric study was transmitted to the Congress and more than a year since the Department had the opportunity to testify on metric conversion before your committee, I think it would be appropriate to review brefly the pertinent findings of the study and summarize metric activity in the United States since that time.

The key findings of the U.S. metric study submitted to you in July, 1971, by the Secretary of Commerce were that:

Metric use, already substantial in the United States, is increasing at such a rate that we will eventually become a metric country, even without further government action.

It will cost less to change to metric following a careful, coordinated plan than to continue our present drift.

These findings led the Secretary of Commerce to recommend that: The United States change to the international metric system deliberately and carefully; the changeover be a voluntary one to predominant metric usage; the changeover costs should "lie where they fall," which means that they will be borne by those that benefit from the changeover.

I can unequivocally reaffirm these statements and recommendations today. In fact, metric use has accelerated greatly over the past 2 years, and it is instructive to look at this activity:

Many large industrial firms have announced plans to go metric. They include IBM, General Motors, Xerox, Caterpillar Tractor, Honeywell, Ford, and others.

Our public schools are increasingly aware of metric. The States of California and Maryland have formally announced conversion plans for their schools; similar action is being considered in several other States.

State activity is not limited to the schools. Several have metric legislation under consideration by their State legislature and several have formed metric commissions. The California State Division of Oil and Gas recently announced a change to sole use of metric. Locally, the Maryland National Capital Park and Planning Commission announced that a metric scale will be used on all of their maps to "help the public become familiar with the metric system."

Road signs giving distances and/or speed limits in both metric and customary units are appearing in several States.

Many key trade associations have adopted prometric resolutions. These include the National Association of Manufacturers, the U.S. Chamber of Commerce, the National Education Association, the American Home Economics Association, and the National Grange.

The National Park Service recently announced plans to add metric designations to all of its signs bearing weights or measures as an aid to foreign visitors.

I think it is obvious from these and other examples that could be cited that the changeover to metric in the United States is now occurring and occurring at an increasingly rapid pace. What is especially interesting is how associated costs, such as tool replacement, and the problem of worker retraining, are being dealt with right now.

First, the practices of those firms in the United States that have already begun conversion has generally been that the firms themselves are assuming the costs of all tool and equipment replacement, even worker-owned tools. This is the stated policy of many of the firms now going metric. In fact, we recently surveyed six major manufacturers to determine their policies. Five—General Motors, Ford, Caterpiller Tractor, and International Harvester Co. and Timken Roller Bearing—confirmed this to be their policy. The sixth, John Deere & Co., has not yet settled this matter.

Incidentally, these firms have also found that most of their equipment—lathes, drill presses, et cetera—need not be changed. The use of metric conversion charts and/or dual dimensioned drawings enables them to produce a metric-designed item on a U.S.-based machine.

Reports from England are that conversion is proceeding in a similar way there. That is, the manufacturers are bearing the cost of replacing tools and equipment where needed. This has been verified in conversations between our staff and the British Metrication Board. In fact, it appears to be of so little concern that there is no mention of it in the Metrication Board's four annual reports or other publications.

I can report that the retraining of workers also appears to be no serious problem. For example, the pharmaceutical industry—that converted to metric almost 20 years ago—reported that the retraining of its workers was easily accomplished; much easier, in fact, than initially expected. Other firms report similar experience.

It is important to remember in this regard that the workers will generally need to learn only a small part of the metric system, for example, to work with millimeters rather than inches. There is much more to metric that they will not need to learn, but the part that is necessary can be learned in a few hours. No special effort or formal training is really needed.

In addition, our industry accepts the responsibility of retraining their workers. In fact, the companies participating in the U.S. metric study's survey of manufacturers indicated that personnel education was a part of the anticipated cost of a changeover.

If any questions do arise concerning the replacement of worker-owned tools and retraining, it would seem that they might properly be resolved by normal labor-management negotiations. In fact, this is already being done. A recent issue of The Bureau of National Affairs' "Bulletin to Management," reported that a recently signed contract between the International Association of Machinists & Aerospace Workers and employers of the 3,000 mechanics covered by the Western States Truckline Maintenance Agreement, includes a provision requiring employers to pay for all tools needed by truck mechanics as we convert to metric.

Incidentally, it is not likely that this will be too costly for these employers, because in reality most tools would not have to be replaced. This obviously includes such items as hammers, saws, pliers, screwdrivers, and adjustable wrenches. It also includes micrometers since existing ones can be used with conversion charts. The only tools that will need replacing are ones like nonadjustable wrenches and taps and dies. And even here, the expenses are not as great as you might think.

For example, although new socket wrench sets will be needed by some workers, there is no reason to change from the present ¼", ⅜", or ½", drive so that only the sockets will need replacing, not the handles, extension bars, or expensive impact drivers.

In fact, because of the large number of metric dimensioned imported cars used in this country and because some American cars now have metric engines, automobile mechanics and garages that wish to be able to service all models already have metric socket wrenches. Fortunately, these metric tools are readily available at reasonable cost.

For these reasons, we see no need for metric conversion legislation to include provisions for reimbursement of the workers or their employers. The worker should have little or no expense. The expense, such as it is, will be borne to a large extent by industry.

Industry must be encouraged to do all in its power to hold down the cost of going metric. I believe the best way to achieve this is to let them know that they will not receive any compensation, but must

solve their own problems. This will create an enormous incentive to incur an absolute minimum expense. Lest this seem too harsh on industry, let me say that it is also they who will receive the initial benefits of the change. Industry will not incur costs that they will not be recovering because expensive changes with no overriding benefits will not be made.

In making the change to metric, changes to metric sizes will be made at a time when it is advantageous to do so: When items are normally scheduled for redesign or for new designs. In accord with this "rule of reason," net costs of changing to metric will be minimized. Although there may indeed be some slight added cost as products are designed or redesigned in metric, this will in most cases be more than offset by the many advantages—use of a simpler system, use of a common design if there are foreign plants, expanded markets, and the opportunity to greatly reduce any proliferation of standard parts in use. Further, the costs are one-time costs. The advantages occur year after year.

I have been speaking about impacts on industry, primarily as related to the concerns of their employees. Let me now turn my attention briefly to the concerns of industry itself, more specifically that part that is known as small business.

Let me first put this discussion into proper perspective by repeating my earlier statement that the United States is presently changing over to metric, so the issue to be discussed is not "should we go metric?" but rather "how can we best ease the impact on small business?" This is not an impact that would be created by this legislation; it is an impact already present.

Senator STEVENS. Let me interrupt you right there. If that is the case, why do we need this legislation at all?

Dr. ROBERTS. As you look at the American economy right now, you find various segments are going to the metric system, As I indicated this includes automotive firms, farm machinery, computers and more. They are doing it because each corporation feels it is in that corporation's best interests. It is occurring in a somewhat haphazard fashion.

When a company as large as General Motors says all new products are going to be made to metric dimensions and when that corporation buys more than $10 billion worth of parts from smaller corporations, their decision to go metric is going to have a major impact on those suppliers.

Senator STEVENS. A little bigger impact than we will have by passing the bill, I think.

Dr. ROBERTS. Yes; that is correct. I think the reason for passing the bill, the reason for having a National Metric Conversion Board, is to try to bring some coherence into the planning by all sectors of the economy so that each company does not just act on its own, but instead acts in concert with others. I think this will minimize the costs, and it will maximize the benefits.

That is the major reason that the Federal Government should exert a leadership role in the cordination of this conversion activity that is occurring right now.

Senator STEVENS. Thank you.

Dr. ROBERTS. We feel strongly that passage of the legislation will help the small businessman in adjusting to metrication. It will enable him to make the necessary changes in a well planned and thus more

efficient way. In fact, the U.S. metric study's report to the Congress stated that small business is the segment of our business and industry that is in greatest need of a coordinated metrication plan. Big business and industry have the "technical, financial, and managerial resources for planning their own metric changeover and dealing with it over a long period. Small businesses do not possess such resources."

Of course, even with proper planning, there will be some impact on the small businessman. Here, let me suggest the need to follow the "rule of reason" I mentioned earlier, and stress that the need to do so is essential for the small businessman. He should make no changes that will not be more than offset by advantages.

For example, he would not spend $5,000 or $10,000 in order to gain an extra $1,000 in business. However, he certainly would spend that amount if he could gain an increase in business over and above his expenses.

Incidentally, the above discussion applies equally as well to another concern of labor, the self-employed worker. This individual should be considered as a small businessman. If he proceeds in a prudent way in making his changes, he will also have no net cost in going metric and such costs as he incurs would be an investment.

Thus, we see no need for subsidies to aid workers or small business.

Mr. Chairman, I believe that the passage of this legislation will not only benefit our industry that is already beginning to change to metric, but also will benefit both our workers and our small businesses by insuring that the changes already underway will occur in the most efficient, least costly way.

Thank you.

Senator STEVENS. Have you reviewed the working draft No. 1 of this bill, S. 100?

Dr. ROBERTS. Yes, we have.

Senator STEVENS. Do you have any specific comments to make regarding it? If you do, I would like to have you submit them for the record, Dr. Roberts. The chairman of the committee and the staff have prepared a series of questions for you and your office. We could submit them to you and have you answer them in writing. They get pretty technical in this area. I think it would be much better to handle them that way.

Dr. ROBERTS. We will submit comments on the legislation and answers to those questions for the record.

Senator STEVENS. Thank you very much.

We appreciate your appearing here today.

[The questions and answers follow:]

ANSWERS TO QUESTIONS SUBMITTED BY THE COMMITTEE TO RICHARD W. ROBERTS

Question 1. In its 1971 study, the National Bureau of Standards proposed that costs lie where they fall, but also suggested that special accelerated depreciation rules, job retraining programs, etc., be considered. Has the Bureau since decided that these government-sponsored programs are not needed?

If yes: Why were these ideas disapproved and by which agency or individuals?

If no: Are these options still being studied? By whom?

Answer 1. Since the conclusion in 1971 of the U.S. Metric Study that was authorized by P.L. 90-472 the National Bureau of Standards has not had resources for additional detailed study of the problems associated with metric conversion. However, we have observed the progress of the changeover that is occurring in this country and the experience in other countries that are in the process of

conversion, particularly Great Britain. This experience leads us to believe that there is little likelihood that the options for special Federal assistance mentioned in the 1971 report will be needed.

Question 2. In 1971, when the Metric Study was released, 11% of American manufacturers were then using the metric system. Do you know what the present figure is, approximately?

Answer 2. We know of no way to update the 11% figure in the 1971 Report because no similar survey of manufacturers has been made since then. As noted in my testimony, there have been announcements since 1971 of plans to use metric by many large industrial firms, including IBM, General Motors, Xerox, Caterpillar Tractor, Honeywell, Ford, and others. These actions, along with the recent organization of the American National Metric Council, whose main function is to coordinate voluntary increased use of the metric system in our industrial complex, are strong indicators that metric use is indeed spreading in industry and at a rapid rate.

Question 3. On page 3 of your statement, you state that several major companies now converting are assuming the costs of tool and equipment replacement, including worker-owned tools. Are these companies assuming 100% of worker-owned tool costs?

Answer 3. The companies are assuming 100% of the cost of such *additional* worker-owned tools as the workers require in connection with each particular changeover to metric currently being made; there is no need to supply each worker with a complete kit of metric tools immediately, or necessarily ever, unless and until he needs them. Indeed, keeping replacement of tools to the minimum number required is an objective that may be lost under a subsidized conversion.

Question 4. The cost of tools and equipment is only one of the concerns of organized labor. Representatives of unions have stated that adjustment assistance, education and other conversion transition costs including relocation, possible job loss, downgrading, loss of income or promotion opportunities, etc., must be considered as cost to workers. Do you agree with this assessment? How have firms been dealing with these problems?

Answer 4. No, we do not agree with this assessment because we feel that in fact these are not really serious problems.

As my testimony stated, "... workers will generally need to learn only a small part of the metric system ... there is much more to metric that they will not need to learn, but the part that is necessary can be learned in a few hours. No special effort or formal training is needed."

All experience, in industries going metric and with U.S. citizens living temporarily in metric countries is that learning the *decimal* metric system is much easier than anticipated, and in fact is a problem with only minor impact. We are convinced that the American worker, and in fact the American public, will be able to easily learn to use metric when and as the need arises to do so.

With training a minor problem, and being financed by industry, the other problems cited, namely "relocation, possible job loss, downgrading, loss of income or promotion opportunities", become essentially non-existant.

Question 5. How many major industrial countries which have recently converted or are committed to conversion have or plan to extend governmental assistance to workers and small businesses?

If any: What has their experience been with regard to costs difficulties, etc.?

Answer 5. Great Britain, Australia, South Africa, and New Zealand are the most recent converts to the metric system and none of them is extending special governmental assistance to workers and small business. Indeed we know of no government that has ever extended such assistance when it converted to the metric system.

Question 6. Quite clearly only a fraction of organized workers would be directly affected by assistance programs. It is my understanding that large numbers of these workers are found in the automobile and aerospace industries which are going metric regardless of Federal action. Do you think that it would be possible to isolate the number of workers who will be affected by the conversion to metric system, without regard to the Federal legislation.

Answer 6. It is not possible for us to isolate or identify with a reasonable degree of certainty those workers who will be directly affected by metric conversion. It would be even more difficult to determine the degree to which they will be affected. Whether the changeover takes place with or without the coordination that would be provided by the pending legislation will have little or no effect on which workers will be affected. The element that might change is the time at which these effects would occur.

This is one of the serious problems with any plan for direct subsidies to workers. For example, it is apparent that not all workers in a given job category will need to replace all of their measurement sensitive tools at the same time. Some may never have a need to replace their tools as a direct consequence of metric conversion. While the employers will be able to determine which tools need to be replaced and at what time, the Federal Government would not be in such a position and undoubtedly would incur much unnecessary expense.

Question 7. You state that costs can be a subject in normal management-labor negotiations. Yet, it would appear that organized labor or, for that matter, small businesses which deal with a large company, may have to absorb the extra cost because of the unequal bargaining advantage of the large firms. Do you think this is a legitimate concern and if so, how would you propose to deal with this situation?

Answer 7. Small businesses which deal with a large company that has a policy and plan to convert are now receiving and will no doubt continue to receive cooperation from the large company particularly as regards the choice of courses that the small business can follow. The large company furnishes dual-dimensioned drawings so that the small-company supplier can for as long as he deems feasible continue to fabricate to customary inch dimensions even though the component he supplies is metrically designed. Such minimum added costs of converting as may be inevitable become a part of the domain of competition among suppliers and will be absorbed by the large company as its payment for a benefit received, per the "rule of reason." Similarly, in the case of labor, the added costs of converting must be minimized and these minimized costs should be handled in management-labor negotiations. Once costs of converting are minimized, these costs should and will be absorbed by him who plans, and is benefited by the conversion—the large company in the case under discussion.

Question 8. You state that the guiding principle to be applied to small business is the "rule of reason." However, it has been charged that many small businesses will be compelled to convert because of their ties to big business or because of market pressures and may not be able to pass the costs on to the public. Under these circumstances, these costs constitute added and not ordinary expenses. Do you think that this is a legitimate objection? Why or why not?

Answer 8. When a small business is subjected to the types of pressures referred to, his first obligation is to determine how best to meet the challenge. For example, if big business asks him to supply a metric-designed component similar to an inch-designed component that he has been supplying previously it is illusory to envision that he must discard his old equipment. He has options that extend all the way from keeping his old equipment and procedures intact and turning out the component as though it had been inch-designed (dual dimensioning enables him to do this) to adapting his equipment at minimum expense to turn out the component in accord with its metric dimensions. In response to market pressures, the small business man must react similarly. He must follow the rule of reason, making only such changes in his equipment and methods as are advantageous and necessary, in which event his competitive position with respect to other small businesses will remain unchanged. Such minimized added costs as are unavoidable will indeed have to be passed on to whomever he supplies, whether it be big business or the public.

Question 9. It has been further charged that compulsory conversion without assistance to small business would give their big business competitors with their ample financial resources commercial advantage. Would you please comment?

Answer 9. Please note that conversion to metric as called for under the legislation would *not* be compulsory. We do not view competition between big and small business as a problem for the following reasons. Many small businesses are not in competition with big business; rather they are suppliers to big business. Often because of their very size and thus added flexibility, they are able to do things big business cannot do, and thus these small businesses are a valuable and irreplaceable part of the operations of big business. It is already apparent that big business will take ample care to insure that this integral part of their operations is able to continue as always. Further, the big businesses they supply are converting because of increased business opportunities—because it is to their economic advantage to make the change. It would thus have the same effect on their small business suppliers—they have a direct concern with the economic well-being of their larger customers.

Other small businesses, of course, do not supply big business, and some of these may be in actual competition with bigger competitors. We feel that this is not a problem worthy of special attention since it is an everyday fact of life for such small businesses. Their larger competitors have certain advantages in all areas—not just those related to metrication. However, the small firms also have an important advantage, and it is for this very reason that they continue to play an important part in our economic structure. The advantage that small business has over its larger competitors is its flexibility, and this should prove especially useful in the change to metric. Small business will need to look to the National Metric Conversion Board for guidance as to when to make their changes, but they will be able to adjust to new market opportunities and make other needed changes more easily due to this flexibility.

Question 10. Assuming that the Committee were to decide that Federal assistance and subsidies are justified, do you think it would be possible to create a workable formula whereby the Federal Government could extend this assistance to cover only legitimate conversion costs and not those costs associated with ordinary replacement? Why or why not?

Answer 10. No. Conversion to metric in the optimum and leastly costly way following the "rule of reason" means that those costs that will occur cannot be isolated or separated from the normal cost of business. Further, there may be so called "legitimate conversion costs" that need not be spent; e.g., replacing a machine rather than using dually-dimensioned drawings and/or conversion charts. A company may legitimately need to incur costs to enable it to convert in a given area; a policy of "no subsidy" is the only way to ensure that the firm does the least costly thing.

Incidentally, another reason for this policy is that once subsidies are allowed, countless others surely will ask for exceptions for their own "special need." For example, one major trade association has informally indicated that its official position favors no subsidies, but that if any are allowed, their members will "go after all they can get."

Thus a policy of "no subsidies" is essential to a conversion program with minimum cost. A program of subsidies, besides being costly to administer, will pay for changes that need not be made. For our economic welfare, it is important that this precedent not be set.

Question 11. Throughout your testimony runs the assumption that metric conversion will be governed by the rule of reason, i.e., only those industries and sectors which find it economical to convert will do so. Does this position rule out the possibility of small business firms or workers who own tools who are forced to convert regardless of their own preferences and judgments and who would not othewise have done so except for the activities of big industry? In this case, would not conversion costs constitute an extra cost and if so, should this not be met by government assistance?

Answer 11. In this specific example of small business firms or workers, let us assume that extra cost results from conversion initiated by the activities of big industry. The question that arises then is "Should this extra cost be met by Government assistance or by the industry that initiated the change to metric?" Our answer is "the latter" because it is only by this type of assistance that the extra costs can be minimized. Government subsidies to cover such costs would introduce inefficiencies and administrative overhead so that such subsidies would be far greater, possibly many times greater, than the minimized costs that industry would have to meet.

Senator STEVENS. Mr. Ken Peterson, legislative representative of the AFL–CIO, accompanied by Mr. Markley Roberts, economist of the AFL–CIO, Mr. Tom Hannigan, assistant to the international secretary of the International Brotherhood of Electrical Workers, and Mr. Albert Epstein, director of research, International Association of Machinists.

Good morning, sir.

STATEMENT OF KEN PETERSON, LEGISLATIVE REPRESENTATIVE, AFL–CIO; ACCOMPANIED BY MARKLEY ROBERTS, ECONOMIST, AFL–CIO; TOM HANNIGAN, ASSISTANT TO THE INTERNATIONAL SECRETARY OF THE INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS; AND ALBERT EPSTEIN, DIRECTOR OF RESEARCH, INTERNATIONAL ASSOCIATION OF MACHINISTS

Mr. PETERSON. Good morning.

Senator STEVENS. Have I pronounced them all correctly?

Mr. PETERSON. You have read every name correctly. I would like to add Mr. Tom Hannigan, assistant to international secretary of the International Brotherhood of Electrical Workers, and Mr. Al Epstein, research director, of the International Association of Machinists, both served as members of the U.S. Metric System Study Advisory Panel and are presently serving as members of the board of directors of the American National Metric Council.

We have just had the privilege of hearing Dr. Roberts as you did, and he expressed his opinion of how the workers would be affected. As direct representatives of the workers coming out of the ranks, we disagree with him entirely.

Now, I will read my statement.

Mr. Chairman, my name is Kenneth Peterson, and I am a legislative representative for the AFL–CIO. I am here today to present the views of the AFL–CIO toward pending legislation dealing with conversion to a metric system of weights and measures in the United States.

American workers have important interests in the issue of conversion to the metric system. Workers' tools, which they frequently provide at their own expense, would become obsolete. Education and retraining would become necessary. And some workers may lose their jobs or lost opportunities for promotion as the result of lack of familiarity with the metric system.

The AFL–CIO, therefore, maintains that any legislation dealing with metric conversion must provide compensation and adjustment assistance to workers for the cost of tools, the costs of education and retraining, and other conversion transition costs, including relocation, job loss, downgrading, and loss of income or promotion opportunities as a result of workers' lack of familiarity with the metric system.

The recent AFL–CIO convention repeated these long-standing concerns in a resolution on the metric system. Here is the resolution passed by the 1973 AFL–CIO convention in October.

THE METRIC SYSTEM

Whereas the metric system of weights and measures is now legal but not mandatory in the U.S.A. as a result of action by Congress in 1866. In recent years, discussion in Congress on the issue of conversion to the metric system has increased. Use of the metric system is increasing and there is a need to plan and coordinate its growth. Any legislation dealing with metric conversion or metric options must deal fairly with American workers and their families who may be adversely affected, and

Whereas American workers have vital interests in the issue of metric options or conversion to the metric system. Some workers' tools, which they often provide at their own expense, would become obsolete. Education and retraining would become necessary for many workers. And some workers may lose their

jobs or lose opportunities for promotion as the result of lack of familiarity with the metric system. Any legislation requiring conversion to the metric system will affect all U.S. citizens as workers, as consumers, and as taxpayers, and

Whereas, unfortunately, in spite of the importance of the metric conversion issue to workers and their families and to consumers generally, much of the public discussion of this issue relies on the inadequate, biased and misleading conclusions of the 1971 metric study by the National Bureau of Standards for the U.S. Commerce Department. There are too many unanswered questions, and there is insufficient evidence:

(1) to support an official U.S. Government policy of facilitating and encouraging metric conversion;

(2) to support a decision about the extent to which the metric usage is necessary and practical;

(3) to support a decision about the degree to which metric usage should be exclusive, predominant, or complementary to existing measurement methods; or

(4) to support a decision about some appropriate conversion period, and

Whereas a reasonable response to our present situation requires a program which can immediately respond to problems resulting from increasing use of the metric system and which can conduct research on which to base future plans. An independent Metric Monitoring and Assistance Board should be established to collect and analyze information about the increasing use of metric measurements and to help minimize the adverse effects resulting from increasing metric usage. This board would act as a central clearing house for information, it would monitor the degree or metric usage, and it would evalute the costs and benefits of metric usage. The board would remain neutral regarding metric conversion until sufficient evidence is available to make a decision, and

Whereas the board would conduct research on still unresolved problems associated with metric usage, including but not limited to the impact on workers and on different occupations and industries, possible increased costs to consumers, the impact on society and the economy, dangers of antitrust violation, effects on small business, the impact on the U.S. international trade position, the appropriateness of using federal procurement to affect conversion to the metric system, the proper conversion or transition period, and effects on national defense. The board would report every year to the President and Congress on its research and on the status of metric usage and would recommend whatever actions are necessary to minimize the adverse effects of metric usage, and

Whereas, furthermore, the board would provide full reimbursement to workers for newly required metric tools, special unemployment and job placement assistance, relocation allowances and assistance, technical assistance, education and retraining opportunities for workers, including financial assistance for apprenticeship training programs, and

Whereas it is essential that the Metric Monitoring and Assistance Board have representatives of workers, employers, consumers, and all others concerned with the problems and potential benefits of conversion to the metric system. It is equally essential that scientists already committed to the use of the metric system be represented only in fair proportion to the rest of society; therefore, be it.

Resolved, That the AFL–CIO calls upon Congress prior to enactment of any legislation requiring conversion to the metric system, to establish an independent Metric Monitoring and Assistance Board with duties and responsibilities as outlined in this resolution, and be it further

Resolved, That this board have representation from all segments of American society including organized labor, and be it further

Resolved, That the board report to the President and the Congress on a yearly basis on its research and the status of metric usage as well as any recommended actions necessary to minimize the adverse effects of metric usage.

You will note that this resolution states specifically that it is premature at this time for Congress to pass any legislation which would commit the Federal Government to an official policy of facilitating or encouraging metric conversion.

This is the policy of the AFL–CIO, and we oppose legislation which does not meet the policy position set forth in the AFL–CIO resolution. In its present form, S. 100 does not meet the goals of the AFL–CIO, and we oppose the bill.

As you know, the AFL–CIO is concerned about the impact of metric conversion on workers who must buy new or duplicate tools. This is one of our concerns and we note that section 18 of S. 100 dealing with "Conversion Assistance to Business and Individuals" authorizes Small Business Administration grants up to $2,000 "to individuals to defray nonreimburseable expenses which must be incurred by them for the purpose of acquiring tools or instruments which are necessary to their continued employment in a trade or business and are required as the result of the implementation of the national plan of metric conversion."

This provision is a step in the right direction toward helping workers adjust to metric conversion, but it imposes a dollar limit which we consider too low and it fails to provide the full range of assistance that we consider essential, not only full reimbursement for the cost of tools, but also special unemployment and job placement assistance, relocation allowances and assistance, technical assistance, education and retraining opportunities for workers, incluuding financial assistance for apprenticeship training programs.

Mr. Chairman, we appreciate this opportunity to present the views of the AFL–CIO on proposed metric conversion legislation. The AFL–CIO takes the position that it is premature for Congress to pass legislation which would commit the Federal Government to an official policy of facilitating or encouraging metric conversion.

We believe that any "Metric Board" that may be set up should remain neutral regarding metric conversion. And we insist on full reimbursement to workers for newly required metric tools, special unemployment and job placement assistance, relocation allowances and assistance, technical assistance, education and retraining opportunities for workers, and financial assistance for apprenticeship training programs, as they are adversely affected by conversion to the metric system.

Thank you, sir.

Tom Hannigan from the International Brotherhood of Electrical Workers requests that you give him just about 12 minutes, sir. He would like to make a statement.

Senator STEVENS. Thank you very much, Mr. Peterson. I would be happy to do that.

Do you have a figure you would propose as a substitute for that $2,000 limitation?

Mr. PETERSON. $4,000, sir.

Senator STEVENS. Thank you very much.

Yes, sir, Mr. Hannigan. We will be happy to hear from you.

Mr. HANNIGAN. Yes, sir, Mr. Chairman. I have a very brief statement I would like to read. I have a little bit longer statement I would like to submit for the record.

Senator STEVENS. Very well.

Mr. HANNIGAN. I also have transcripts of the U.S. Metric Study Labor Conference, held October 28 and 29, 1970, of which I was chairman. I would like to submit it for the record because I believe the summarized version which most people have been reading in the 12-volume metric study does not do justice as to actually what took part that day. And I think people should really fully understand the spirit of the labor conference that day.

Senator STEVENS. We will print without objection your full statement and the document from the conference in 1970. And you may proceed with your statement.

Mr. HANNIGAN. I also have with me a book and suggest that the staff would get hold of it. It is called, "The Executive's Guide to Planning Transitions to the Metric-SI System," by Robert C. Sellers. Mr. Sellers is a friend of mine, and I have worked with him closely on a number of cases. He called me for lunch yesterday. He is a very strong prometric advocate.

Mr. Sellers is a consultant or metric matters for businesses. He has taken probably the most frank and candid look at the problems related to the metric system of any one individual organization around. I think his efforts shows the quality of work which could have been done by the U.S. metric study group if they were really objective regarding metric conversion.

I will take a minute to quote from it just to give you a flavor of just what is available. It is important to note Mr. Sellers is a very strong prometric advocate. Now I quote from his book.

"The transition to the international metric system is undoubtedly the greatest change and commitment American industry has ever had to face."

Further down, "The biggest hurdle to be crossed is not to treat the subject of change in something as basic as our system of measurement lightly. The ramifications of the change are tremendous and may represent one of the largest single outlays of capital in a company's history."

This is his advice to financial people.

He says here: "However, in most cases, this is not the case—I am excerpting—for with adoption of metric-SI system, we also face a wholesale revision and updating of our engineering standards and technical standards."

And the whole book is literally loaded with warnings he has given to businessmen plus the opportunities to make money. And I think it would be a very excellent starting point for an objective analysis of the problem associated with metric conversion done by a metric conversion advocate.

Now, I will read my statement.

The International Brotherhood of Electrical Workers is concerned that Congress is about to enact major social economic legislation without sufficient knowledge regarding its full impact on this Nation. We are concerned about the effect of metric conversion on the ability to manage the U.S. national economy. We are concerned that metric conversion will accelerate the present trend toward competition stifling greater economic concentration. We are concerned about the effect of metric conversion on the U.S. position in trade, and its impact in our social and cultural values. More directly, we are afraid that hundreds of thousands of jobs will be lost as a result of increased import in the metric position. We are afraid metric conversion would have an adverse impact on the income of workers on incentive systems because of lower productivity due to the loss of experience.

In the construction industry, difficulties maintaining dual inventories and controlling deliveries to jobsites could result in the extensive

loss of time. All workers would require additional training, the amounts and costs of which vary with the degree of metric measurement in the job content. Retraining of the work force would cost companies, contractors and unions millions of dollars.

Many mechanics would have to purchase new tools. They will have to have two sets of tools and assume the burden of maintaining, storing and transporting them. Dual thinking will result in increased responsibility and job strain as a result and be a source of potential safety problems. Many workers will either be faced with strictly limited opportunities or be forced out of the labor market.

In many cases, the collective bargaining as always will be a very effective instrument in protecting the interests of workers. Recently, the 11-State western region of the machinists negotiated a contract requiring the company pay the cost of all metric tools. We are urging every local union to analyze its own situation and to review and redraft job security clauses, education and retraining clauses, promotion provisions, income protection and piecework clauses, in anticipation of the effect of metric conversion.

If this country plans to facilitate and encourage conversion to the metric system, we strongly suggest that it involve the AFL–CIO, State and local central bodies, international unions and local unions.

In short, organized labor has much to contribute. It is structured to be an essential factor to a successful conversion program. As proven throughout history, labor will cooperate if the program is reasonable and practical and in the interest of both our members and this great Nation.

But the effects of metric conversion are much too broad and far-reaching to be solved by collective bargaining alone or within the structure of the labor movement. The International Brotherhood of Electric Workers looks to Congress to assure that legislation is responsive to the needs of America's working men and women. We strongly support the concept of metric monitoring and assistance board.

I thank you very much for your time, Mr. Chairman.

Senator STEVENS. Thank you very much, gentlemen.

I take it that organized labor is not opposed to the conversion. They are opposed to the method in which this bill suggests that Congress treat this subject, is that correct?

Mr. PETERSON. That is correct, sir.

Mr. EPSTEIN. If I might add, basically, the labor movements and many others are not in favor in encouraging unnecessary conversion. It does not want the Government to be a participant in encouraging conversion, but to leave it to the individual group to decide when conversion is advisable and to assist those who are adversely affected by such conversion.

Senator STEVENS. I appreciate that. I think Mr. Peterson said we should explore the ramifications of conversion through the use of Government procurement. That would be an encouragement in some ways, I think.

Mr. PETERSON. That would be a mandatory thing, sir, because you can imagine some procurement officer telling them to bring the metric measurement. That is the end of the voluntary system.

Senator STEVENS. Yes, I agree with you.

Well, Mr. Peterson, the chairman of the committee has had questions prepared by the staff, and I assume he has approved them. And we would like to submit them to you so you could provide answers for the record if you would be of assistance in that way.

Mr. PETERSON. Certainly.

Senator STEVENS. If your colleagues could offer suggestions on any of these, if you would like to do so; we will suggest that the staff get a copy of the Sellers Study.

Mr. HANNIGAN. Robert C. Sellers. "The Executive's Guide to Planning Transition to the Metric System."

In regard to the voluntary aspect of it, he has a quote in here: "Although legislation speaks of voluntary change, events elsewhere suggest that the ultimate net effect will be no less than a mandated change." And this is a prometric advocate.

Senator STEVENS. Very good. Thank you very much. I appreciate your appearance.

Mr. PETERSON. Will you send us the questions, is that what you want to do, or if you will give it to us now, we will be quite happy to answer them now. If you want a written reply, we will do that.

Senator STEVENS. I would appreciate it if you would answer them in writing.

[The statement and information referred to follows:]

STATEMENT OF TOM HANNIGAN

It is important to clear up, immediately, a possible misunderstanding: The IBEW is not opposed to the metric system.

The International Brotherhood of Electrical Workers (IBEW) is concerned that Congress is about to enact major social economic legislation without sufficient knowledge regarding its impact on this Nation. We are concerned about its impact on our membership as workers, consumers and taxpayers.

Presently, there are too many unanswered questions regarding the advantages and disadvantages of conversion to the metric system and, unfortunately, decisions are being based on slogans, myths, distortions and half truths. The need for conversion to the metric system should be analyzed in proper perspective if we are to draft sound workable legislation. A frequent analogy between the United Kingdom and the United States totally distorts the scope of the undertaking. It is like comparing a rockfall to an avalanche. On one hand we have the U.S. with its 1.2 trillion dollar economy; on the other hand, we have the U.K. with an economy of a little more than 100 billion dollars. The U.S./U.K. analogy deteriorates further when one considers the type of national economy. The U.K. is an island nation and its very existence depends upon international trade. Exports account for less than 5% of the U.S. GNP. In short, any decision based on the comparison of the U.S. economy to that of the U.K. would be grossly misleading.

It is grossly misleading to list the United States with a few underdeveloped nations as the only nations in the world not committed to conversion to the metric system, since the U.S. industrial giant represents about ⅓ of the total world's production.

We are concerned about the effect of metric conversion on the ability to manage the U.S. national economy. Imagine the U.S. economy in the fourth or fifth year of a 10-year conversion period—the point of no return—being confronted with the economic conditions of the past five or six years. We have experienced soaring prices, increasing unemployment, tight money, serious profit squeeze, corporate liquidity problems, non-planned federal budget deficits, decreased industrial production and business activities, continuing balance of trade deficits and persistent international monetary problems. These economic problems combined with the costs and disclocations associated with conversion to the metric system could possibly have caused a total economic breakdown. Consider a small or medium-sized businessman today needing a loan to implement some phase of metric conversion. If he can find money at all, it would

probably be at rates in excess of 10%. Multiply this one business by thousands of others in the same predicament and you would have a monetary crisis unperiled in the economic history of this country. In a strong economy the cost of conversion to the metric system would intensify inflationary pressures. In a slack economy they would impede and possibly preclude recovery. In brief, conversion can only be accomplished in a balanced full-employment, stable economy which must be maintained throughout the entire conversion period. This best of all economic conditions has never achieved for long and for the past six years the Nixon administration seemed unable to accomplish even for the briefest period. Thus, one of the principle limitations to a successful metric conversion is our ability to manage the economy through this difficult period. It is extremely important that the policies and laws of the Federal Government be consistent. If Congress commits this nation to a policy of facilitating and encouraging metric conversion, it must have some means to assure that the Federal Reserve Board will not be in conflict with this goal. Also, it must assure that facilitating and encouraging metric conversion does not conflict with the goal of the Employment Act of 1946—to assure "maximum employment, production and purchasing power."

We feel conversion to the metric system would accelerate the undesirable trend towards greater economic concentration. Many corporations and organizations testified that the successful metric conversion would require either legislation exempting the inter and intra industry planning and coordination associated with metric conversion from present anti-trust law or a reinterpretation of present anti-trust laws. Also, small and middle-sized businesses badly in need of capital for metric conversation and unable to find any at prices they can afford, could be easily acquired by the major corporations at prices much below their true market value. Such practices would inevitable reduce creativity and stiffle competition.

We are concerned about the effect of metric conversion on the U.S. position in world trade. One of the primary goals of conversion is to strengthen our position in world trade, but conversion to the metric system would put the U.S. economy at a distinct trade disadvantage because the cost of conversion would have to be added to U.S. produced goods while foreign countries could take advantage of broadened markets, increased production, and lower production costs because of economies of scale. The end result would be a massive influx of foreign goods in the U.S. markets and the loss of hundreds of thousands of U.S. jobs. Also, foreign made metric tools, instruments and equipment in great demand by U.S. industries would flood the country. The U.S. capital would be attracted by profitable direct foreign investments. Marginal plants prematurely obsolescent because of forced conversion would very likely be rebuilt in foreign countries.

In short, instead of increasing exports, the conversion would increase imports and intensify existing balance of trade and payments problems, plus aggrevate unemployment problems.

We are concerned about the impact of metric conversion on our social and cultural values. The customary system is irreversable ingrained in our everyday life, our literature, our music and our art. It is not unreasonable to believe the American public will resist the change of what they are familiar and value dearly especially if this change will not directly benefit them or enrich their life in any tangible way. If public support is essential for successful conversion and so little is known regarding it, the entire planning process is questionable. Given the enormous and urgent problems which are presently confronting this Nation, it can be reasonably assumed that the public would assign the 60 to 100 billion dollar conversion cost a very low national priority. Legislation presently being considered recommends letting these "costs lie where they fall." Labor is concerned upon *who* they fall.

In short, as both social and economic costs become more evident with increasing usage of the metric system, initial public reservation could rapidly become public rebellion.

So much for the areas of doubt. Now lets consider items in which labor has a little more confidence. Since the voluntary use of metric weights and measurements has been legal since 1866 it is obvious that current legislation is either unnecessary or somewhat less voluntary, especially if it provides for a national program which includes a central planning and coordinating body. The IBEW agrees that increasing use of the metric system is inevitable and a need to plan and coordinate its growth is obvious but we are also aware of the fact that worldwide usage of customary standards and specifications is still increasing at a greater rate than metric base standards. We agree that legislation requiring con-

version to the metric system will affect every man, woman and child alive today and future generations to come. We believe that it will require many severe economic dislocations and undesirable social disruptions. We feel it is extremely important to fully understand that there is no cheap method of converting to the metric system. The estimates of cost range from 60 to 100 billion dollars and that these costs will be in competition with other pressing national priorities. We are convinced that the U.S. and the world will have a dual system of measurement for at least the next 50 years.

More directly, the IBEW is afraid that hundreds of thousands of jobs will be lost as a result of increased import due to conversion. We are afraid conversion would have an adverse impact on the income of workers on incentive systems as a result of lower productivity due to the loss of experience. In the construction industry, difficulties in maintaining dual inventories and controlling the schedule of deliveries to job sites would result in extensive loss of time. All workers would require additional training, the amounts and costs of which vary with the degree of measurement of job content. Retraining the work force would cost companies, contractors and unions millions of dollars. Many mechanics will have to purchase new tools, they will have to have two sets of tools and assume the burden of maintaining storing and transporting them. Dual thinking will result in the increased responsibility and job strain and be a source of potential safety problems. The old and the disadvantaged and the less skilled workers will either be faced with greatly limited opportunities or forced out of the labor market.

In many cases, the collective bargaining, as always, will be a very effective instrument in protecting the interests of our members. Recently the 11-state western region of the machinists negotiated a contract requiring the company pay the cost of all metric tools. We are urging every local union to analyze its own situation and to review and redraft job security clauses, education and retraining clauses, promotion provisions, income protection and piece work clauses in anticipation of the effect of metric conversion.

If this country plans to facilitate and encourage conversion to the metric system we strongly suggest that it involve the AFL-CIO, State and Local Central Bodies, International Unions and Local Unions. Organized labor has existing education and training structures which can do much to minimize the impact of conversion.

The IBEW, for example, has 102 full-time Training Directors, 750 Local Union Training Committees, of which 392 are in the construction industry. We presently have 1,028 Apprentice Training Programs, 226 Trainee Programs and 940 Short Courses. Presently, less than 4% of our material and programs have any reference to the metric system.

In the Construction Industry we estimate 30 to 40 classroom hours of instruction in the metric system for Journeymen and 50 to 80 hours of instruction for the instructors. In addition there would be the costs of revising existing textbooks and training materials, the development and purchase of new training aids, classroom space, cost of travel and compensatory time. Presently, we have no idea what the total cost would be, but feel we should not be expected to assume costs which are of questionable benefit to our membership.

The effects of metric conversion are much too broad and far reaching to be solved by collective bargaining alone, so we look to Congress to assure that legislation is responsive to the needs of America's working men and women. This Committee is considering a bill dealing with metric conversion which we feel is premature and not in the interest of American workers. We feel there is no evidence supporting a 10-year conversion period. There is no evidence supporting whether the language should be exclusive or predominant or merely what is necessary and practical. There is no evidence in support of establishing policy by the Federal Government to facilitate and encourage metric conversion. We feel that an 18-month planning period for such an enormous undertaking is much too short.

We feel the only reasonable response to our present situation requires an action-oriented program which can immediately respond to the problems resulting from increasing usage of the metric system and to conduct the necessary research on which to base future plans. An independent metric Monitoring and Assistance Board should be established for this purpose. This Board would act as a Central Clearing House for information and monitor the degree of metric usage, its rate of increase and evaluate its costs and benefits. The Board

would remain neutral regarding metric conversion until sufficient evidence is available to make a sound decision. The Board would conduct research on still unsolved metric problems associated with metric usage. It would report every year to the President and to Congress on its research and status of metric usage and recommend whatever executive and legislative actions are necessary. Furthermore, the Board would provide full reimbursement to workers for newly acquired metric tools and special unemployment and job placement assistance, relocation allowances, technical assistance, education and retraining opportunities including financial assistance for apprentice training programs. It is essential that the metric Monitoring and Assistance Board have representatives of workers, employees and consumers and all others concerned with the problems and potential benefits of conversion to the metric system. It is equally essential that individuals and organizations already committed to the use of the metric system be represented only in fair proportion to the rest of society.

In summary, for decades, maybe even generations, labor can be expected to be confronted with many problems arising from increasing usage of the metric system in our country, but I am sure, with responsible metric legislation, we can meet these challenges and continue our pursuit of a better life for all workers.

Testimony of Thomas A. Hannigan, Assistant to the International Secretary, International Brotherhood of Electrical Workers, at the U.S. Metric Study Labor Conference October 27–29, 1970

GENERAL COMMENTARY

(By John T. Benedict, Manager, Technical Information, Engineering & Research Office, Chrysler Corp.

Cost.—While considering Metric Study "Findings" and possible legislative action it is in context—and, in fact, vitally important to discuss cost . . . since cost and disruption are prime deterrents to metrication in areas where there is no incentive to change. For purposes of a brief overview, costs may be examined at the industry, company, and national levels.

In the official Metric Study document "The Manufacturing Industry" it is reported (NBS SP 345–4, page XIX) that—

". . . the most thorough studies on the cost of metrication were conducted by companies engaged in the manufacture of transportation equipment, particularly automobiles and trucks. Reporting in industry 3711 are three companies, two of which are giants of the automotive industry of the world. We are well acquainted professionally with those responsible for submitting the reports and conducting the investigations . . . we have a high degree of confidence in the estimates . . . we deduce that the cost of metrication in the passenger car automobile industry over the period of transition would be about 6 percent of value added. If this cost is spread evenly over a period of 12 years . . . and if the percentage added cost of metrication of suppliers to the automobile manufacturers is about the same as that of the manufacturers themselves, the *cost* of metrication borne by the consumer would be about ½ of one percent of sales value, that is about $15 on a $3000 automobile. It seems that these cost estimates, which are based upon very serious studies . . . represent a realistic estimate of the cost involved in a fairly complicated product such as automobiles which account for a very large part of the gross national product . . ."

Having set these official, documented cost estimates up in our minds, we now may ask: "What, then, would be the 'price tag' on a 'metric car'?". . . and we can estimate that it would cost the American public on the order of $1.5 billion. (This figure is obtained by applying the $15/car estimate, over a 12-year period, assuming average price of at least $3000.)

For *Manufacturing Industry* as a whole, the final Metric Study report (NBS SP 345, page 110) says ". . . the total overall 'Base' cost of going metric was calculated to be about *$25 billion*."

For some *individual companies*, the cost of forced metrication clearly would be on the order of some hundreds of millions of dollars. For example: in *Congressional Digest* magazine, Dec. 1971 issue, page 307, Mr. S. H. Watson said: "One large multi-billion-dollar electrical company, after careful study, reported a nominal 300 million dollars as its cost of converting to metric units; the cost would be higher if the program were confined to a ten-year period and lower if spread over 17 years. The several knowledgeable people who made the study

figured that if, in the transition period, there were a dependable way of identifying and evaluating every expense that should be properly charged to the program, the actual, overall cost would be somewhere between 500 million and one billion dollars. Interestingly, another multi-billion-dollar electrical corporation of approximately one third the size reported a metric conversion cost of 100 million dollars."

In regard to the total cost of metrication for the *nation*: adding costs estimated by various sectors, figures in the final Metric Study report (NBS SP 345) indicate that the total United States cost would be substantially more than *$45 billion*. In the *Congressional Digest*, Dec. 1971, page 305, Mr. W. D. Rinehart (Nat'l Metric Advisory Panel, NMAP) said: ". . . during the study the National Bureau of Standards reported to the non-government panel that the cost of national conversion would be *$60 billion* . . . ." And, on page 307 of the same *Congressional Digest* issue, another NMAP member, Mr. S. H. Watson, places the cost of U.S. national metric conversion at *$100 billion*.

Clearly, there is no one generally accepted figure for the potential cost of United States metrication. However, whether the correct number is $45 billion . . . or $60 billion . . . or $100 billion . . . it is an enormous amount of money.

In considering "the U.S. metric question," Congress will take the overall cost into account—and also consider that a crash program of forced metrication would be a long and difficult process . . . characterized by widespread disruption and confusion—since national metrication, ultimately, would touch the everyday lives of all Americans and would affect products and operations of every business.

Other "Findings":

In a straightforward manner and with truly constructive intent to assist Congress in viewing pertinent information—we should like to take note of some material that would seem to indicate that, in the United States, Industry, Business, Labor, and the Public, generally, have no need or desire to initiate full-scale metric conversion programs—and that the Department of Defense would have grave difficulty in fulfilling its responsibility while a national metrication program was being implemented.

Let's turn, now, to some of the *official documents* in the 13-volume series of reports on the Metric Study.

Following are some key quotations:

International Standards Reports (NBS SP 345–1):

"SI (metric) usage in international standards as a measurement language does not of itself pose any serious complications to the U.S. . . ."

Federal Government: Civilian Agenies Report (NBS SP 345–2):

". . . there would be certain added costs of operation imposed on Federal agencies by the conversion effort. Even with conversion of measurement units alone, employees already on duty would have to be trained and the general populace familiarized with the new system, measuring instruments converted or replaced, publications revised, legislation involving specified weights or measure amended and some computer programs (e.g., air traffic control) rewritten. With conversion also of engineering standards to a rational SI base, there would be additional expenses for extra standards-developing activity, and for maintaining a degree of dual inventory or parts as long as customary-engineered equipment remains in use."

Commercial Weights and Measures Report (NBS SP 345–3):

"Purpose is to . . . analyze the problems that increased metric usage would have on state and local weights and measures jurisdictions (e.g., laws and regulations, testing equipment, and training programs)." . . . "Evidence indicates that evolutionary metrication in the commercial weights and measures area is unlikely. . ."

The Manufacturing Industry Report (NBS SP 345–4):

". . . under a coordinated national conversion program, present non-metric users generally saw more . . . disadvantages than advantages . . . more companies . . . are against increased metric use in their own industries than for it. . ."

Non-Manufacturing Businesses Report (NBS SP 345–5):

"The vast majority of companies saw no reason to change their system of measurement unless the whole U.S. does . . . they had no intention of increasing their own metric use without the rest of at least their own industry."

Education Report (NBS SP 345-6):

"The chief inherent educational advantage of the customary inch-pound system is its familiarity and the fact that it is embedded in a thousand years of post-Anglo-Saxon culture. Other educational advantages become apparent when the customary system is compared with the metric system . . . metric units are either too large or too small for very young children to handle easily . . . the inservice (metric) training of a million elementary school teachers is a major concern . . ."

The Consumer Report (NBS SP 345-7):

". . . a majority of consumers are satisfied with the customary inch-pound system . . . they know very little about the metric system . . . and they could be expected to react wtih apathy and indifference to any planned conversion program . . . a majority of respondents were unable to name a single metric measure . . . the consumer is little affected by increasing worldwide use of the metric system . . ."

International Trade Report (NBS SP 345-8):

"The notion that the U.S. is losing exports to metric countries because its products are not designed and manufactured in metric units and standards appears to be ill-founded . . . U.S. exporters and importers rank the measurement factor very low, indicating it affects trade only slightly . . . exports of most product classes in 1975 would change little by converting to the metric system . . ."

Department of Defense Report (NBS SP 345-9):

"If conversion to the metric system is directed, the DOD transition will have a significant impact on mission capability unless sufficient additional resources are made available . . . total additional funds for transit to DOD use of the metric system are . . . $18 billion . . . and cannot be absorbed within DOD budget without deterioration of the military posture . . . there will be no major advantages . . . and major disadvantages will occur . . . conversion of the country to the metric system could adversely impact on ability of the United States to support its military forces during the proposed transition period . . . no inflation factor was applied (to $18 billion cost) . . . cost estimate does not include increased cost of "off-the-shelf" type metric items . . . cost of mistakes by operating personnel due to 'metric mix-ups'was not estimated . . ."

A History of the Metric System Controversy in the United States (NBS SP 345-10):

". . . Almost two centuries of debate have attended the metric question in this country. Thomas Jefferson and John Quincy Adams were embroiled in this controvesy. It is yet to be resolved, (Mr. D. V. DeSimone, 1971) . . . the substitution of an entire new system of weights and measures instead of one long established and in general use, is one of the most arduous exercises of legislative authority (President John Quincy Adams, 1821) . . ."

Engineering Standards Report (NBS SP 345-11):

". . . it is the engineering practice rather than the measurement units that determines compatibility or incompatability of most standards . . . dimensional specifications in different metric countries are incompatible as frequently as those in countries using the inch unit . . . thus a change to metric units does not by itself make standards compatible."

Testimony of Nationally Representative Groups (NBS SP 345-12:)

". . . Trade associations, labor unions, professional societies, and other groups were invited to submit their opinions and cost-benefit estimates concerning a possible future conversion to the metric system on behalf of their membership to the U.S. Metric Study.

. . . Many contributions report little significant usage of metric units, but two-thirds of the reports indicate some metric usage, usually in research-related activities.

. . . Transition problems appear significant in three areas: where metrication would require substantial redesign, modification or replacement of manufacturing equipment and manufactured products; where additional stocks of materials and repair parts would be needed; and in consumer education."

A METRIC AMERICA: A DECISION WHOSE TIME HAS COME
(NBS SP 345)[1]

Manufacturing industries	$25, 000, 000, 000
Non-manufacturing businesses	?
Weights and measures	340, 000, 000
Federal civilian agencies	60, 000, 000
Department of Defense	18, 000, 000, 000
Labor	?
Education	1, 000, 000, 000
Total, at least	45, 000, 000, 000

[1] Refer to "Benefits and Costs" (begin p. 97).

"The cost and inconvenience of a change to metric will be substantial, even if it is done carefully by plan . . ."

Also worthy of note are the following statements by various National Metric Advisory Panel members in articles published in December, 1971, issue, *Congressional Digest* magazine:

"I am strongly opposed to a ten-year planned conversion period. This position is based on our inability to identify any major advantages arising from conversion to the metric system and the glaring lack of information regarding its impact on a trillion dollar economy."

. . . T. A. Hannigan, Director of Research & Education, International Brotherhood of Electrical Workers.

"The (Metric Study) findings, if carefully examined, will reveal that the U.S. public, business, and labor have no real desire to force metrication. . . . The American consumer would feel the cost of price increases on American products as manufacturers attempt to pass along their cost of converting every machine and employee to the metric measure. . . . It is my sincere belief that a 'forced metrication' law would have detrimental results upon the American economy and the American public."

. . . W. D. Rinehart, Ass't General Manager, American Newspaper Publishers Association Research Institute.

"The reasons against a nationally programmed conversion to metric units of measure in the United States, and the abandonment of the well established customary units, are simple and of readily recognized merit. They are: (1) a price-tag of one hundred billion dollars. (2) a period of at least 50 years of national controversy and confusion, and (3) incredible weaknesses in the arguments of the advocates of metrication in support of the benefits they claim. A fourth consideration is the not remote possibility that a conversion program, if launched, would be abandoned before completion because of massive public indignation."

. . . S. H. Watson (retired) Formerly Dir. of Corp. Standardizing, RCA.

"We should bear in mind that foreign trade is between four and five per cent of the U.S. Gross National Product. Half of our foreign trade is with English-speaking countries; additionally, much trade with the metric countries is conducted in English units. At most, then, about two per cent of America's trade is in metric units. Factors such as price, delivery, credit and competition are more important in gaining or losing trade than units of measure."

. . . B. C. Wiggin, President, Advanced Instruments, Inc.

Summing Up

Once again, we see evidence that—when different people sift and analyze the same mass of information on complex, controversial subjects—they often draw strikingly different conclusions. Certainly, it should be acknowledged that the "Findings" reported upon completion of the massive Metric Study represent one possible set of conclusions. However, our purpose in calling your attention to the foregoing excerpts from Metric Study documents, etc. is to point out that there also is another—and quite different—set of conclusions available from material produced during the Metric Study. It is, indeed, heartening to observe Congressional interest in examining the matter fully before forming a judgment concerning possible legislation.

At this point, it may be appropriate to comment on the probable compulsory effect of cumulative forces generated by an on-going nationally coordinated program of metric conversion.

It sometimes is said that any such program would be "voluntary." Yet, upon thoughtful reflection, it is seen that any reference to "voluntary" in respect to a legislated, nationally coordinated conversion program, with overall timetable and predetermined target date for completion, is a *contradiction of terms*. Viewed realistically, it is apparent that no individual company or industry could refrain from taking part in such a national program—even though, at the outset of the program there had been no functional need or economic justification for that company or industry to adopt the metric system.

In the judgment of Congress, is it imperative, in the long-term national interest, to adopt the metric measurement system? If so, let's face-up to it openly and honestly. If, overall, the country's long-term economic well-being requires that we now enter a long period of personal inconvenience and expense to many millions of Americans and disruption and financial penalties to many thousads of businesses—then let's put it frankly in those terms. Surely, we all can—with understanding and support—accept a situation where the nation's long-term interests transcend a multitude of individual interests!

But, if that is the case with respect to the U.S. impelling *need* for metric conversion—let us not begin a long exercise in self-deception. Let us neither exaggerate the urgency and potential benefits, nor depreciate the difficulty and cost.

In this regard, let us have no illusion about the reference to "voluntary" metrication. If a national program, backed by Federal law, progresses in conformance with a mandated timetable—it is not really *voluntary*. And, if it is truly *voluntary*—it won't occur nation-wide during the next 10–15 years.

We recognize fully that the United States Congress will decide this question. Congress will decide where metrication ranks among national priorities: And, in its broad allocation of national resources, Congress will determine what portion is to be directed into metrication. Congress will judge whether or not the nation's need for metric conversion is so vital and so urgent as to warrant diverting the country's energies into this channel—and on a scale that may call for the expenditure of from $45 billion to $100 billion over a 10-year period.

CLOSURE

S. 2483 is a momentous legislative proposal. It is difficult to imagine a law that, potentially would have an effect more far-reaching, long-lasting, and costly than one that would require the United States to abandon its deeply imbedded, highly satisfactory customary inch-pound measurement system and replace it with a different system.

Nowadays, in some circles, it is fashionable to ridicule the inch-pound system. It is derided as cumbersome, complex, and a hodgepodge of units.

Yet, really, how many people do we know who are having serious difficulty with it? And, I think all would agree that it would be ridiculous to say that U.S. industrial growth and development have been handicapped by the inch-pound system.

Actually, the inch-pound system's variety and versatility are part of its strength. It is a *practical* system that developed and grew in response to the *needs* for various measurement units in real-life situations. That's why it is so effective: the units are well-suited to the purposes for which they are used.

Let's put the relative merits of the two systems in perspective by saying that *both* the inch-pound and the metric measurement systems are good systems. And, if the metric system is "better," or "simpler"—then it should be noted that even the most ardent proponents do not cite *that* as a sufficient reason for the United States to convert to the metric system.

Where, then, does one look to find justification for launching an all-out metric conversion in this country? Despite a massive effort, the Metric Study failed to set forth a compelling reason. It is incumbent upon the proponent of change to provide factual argument in support of his proposal. Lacking such convincing evidence—one may conclude that, in very broad terms, the country does not have a "metric problem" of a kind or size that requires a Federal law for its solution.

If permitted to pursue voluntary evolution in choice of measurement units, individuals and companies throughout the U.S. can continue to be "masters of change"—and retain the freedom and flexibility to gain maximum benefit and value from whatever change they may undertake in their use of metric units.

There is widespread questioning of the justification for a nationally coordinated metric conversion program that would be called "voluntary"—but which, in effect, would become mandatory. We share the concern of many people who are disturbed over the possibility that metric conversion may be forced upon the nation needlessly and at enormous cost. Indeed, it is apparent that prohibitive costs and lack of commensurate economic benefits may cause metric conversion to exert a substantial, prolonged "drag" on the nation's economy—and the possibility of triggering an adverse effect on the economy is one of the most difficult and serious aspects of the question now being considered by Congress.

SUGGESTIONS FOR LEGISLATION

If, after thoroughly assessing the situation, Congress decides that, ultimately, the United States must adopt the international metric system as its primary system . . . and that legislative action is needed now, to accelerate the rate of increase in metric unit usage in this country—then, perhaps, the presently discerned need would be served best by what, basically, would be an appropriate "U.S. Metric Conversion Planning Bill." Such a Bill would establish a Presidential Commission (or Board) to devise a master plan and program aimed at making the international metric system the primary measurement system in the United States. The Commission would be required to present the plan to Congress at a stipulated time (two years hence). And Congress then would determine what further legislation (if any) were needed.

Thank you, very much, Mr. McKelvey. I think we are about on schedule. May we move on to our next speaker who will attempt to broaden his personal knowledge of the International Brotherhood of Electrical Workers and to the entire construction field. Is that correct, Tom? This is Mr. Thomas Hannigan who will give us a viewpoint of the construction workers.

Mr. HANNIGAN. Good morning, brothers and sisters, ladies and gentlemen. Let me begin by saying to the Metrication Advisory Panel, I do not have my report in final form. I am speaking from an outline. It will be in final form within a couple of weeks. And I want to state some of the qualifications before we go any further.

The Building Trades Department of the AFL–CIO does not have an official position on metrication and neither does the IBEW which I represent. We prepared this report by conducting a mail survey to 17 affiliated building trades department internationals. I received a response from four: the Painters and Allied Trades; the Operative Plasterers and Cement Masons; the Bricklayers, Masons and Plasterers; and, the United Brotherhood of Carpenters and Joiners. Counting myself, that would be five responses.

I attempted a phone survey late last week just before leaving town, but I couldn't make contact at that time. The people I have talked to have a very good understanding of the construction industry and have contributed much to the thoughts I am going to present on the future problems that could confront the industry.

I'll read a statement from our Battelle Report which we commissioned about three years back. I think it sums up the industry very well.

"The structure of the construction industry does not readily lend itself to major change. The industry is highly interrelated and both fragmented and decentralized with thousands of companies participating to some extent.

"The companies include architectural and engineering firms, contractors, material suppliers, financing institutions, state and local governments, plus many others. Each organization is basically concerned with the particular segment of the overall construction process and a specific area of responsibility.

"For instance, architects are responsible for the design and specifications, or contractors with the erection and assembly of the structure. No one single group has sole responsibility for the total process, and in many cases instances of communication and cooperation are poor and entirely lacking."

Now that we know the nature of the beast we are contending with, let's take a closer look at it. The construction industry consists of—is broken down into three major groups: non-residential building, residential building, and non-building construction.

In the non-residential building we have commercial, manufacturing, education, hospital and health, public, religious, recreational, and miscellaneous. In 1969 this amounted to about 25 billion dollars.

In residential building we have one and two family homes, apartments, and non-housekeeping units. This represented about 25 billion dollars also.

In non-building construction we are talking about streets and highways, bridges, utilities, sewers and water, and other general non-building construction. This consisted of about 17 billion dollars; all three together account for roughly a total of 70 billion dollars of volume.

Then we are also concerned with both new construction and renovation and remodeling repair, each of which will have entirely different impact as far as metrication goes. New construction might be easier than maintenance and repair. We must live with buildings that exist right now and all the problems that they would be presenting for the next hundred years.

Another major part is the work force. This is of primary interest to us in the building trades. The BLS Employment Survey gives a very simplified breakdown of it but for this brief report it is adequate. Production workers employed by General Building Contractors amounts to about three million people. General building contractors employ about 875,000; heavy construction contractors 750,000; special trade contractors about a million and a half.

The special trades are broken down into plumbing, heating, air-conditioning. (Employing around 325,000), painting, paperhanging, decorating (roughly 125,000), electrical work (230,000), masonry stone work and plastering (197,000), roofing and sheetmetal work (102,000). There are definite problems with this; but this is just a rough breakdown of the work force.

A little bit finer breakdown of the work force, drawn mostly from the Kaiser Report prepared by Dunlap and Mills, generally concluded the work force consists of a large pool of people possessing varying degrees of necessary skill. There is constant movement in and out of this work force. Generally speaking, there is very weak industry attachment. It takes about 1.8 persons to fill an annual job, according to Social Security reports.

The pattern since World War II has been an increase of 39 percent between February and August in the work force, and a decrease of 26 percent between August and February. Roughly 78 percent of the people employed in the work force are in local unions—which are affiliated with the Building Trades Department. The chief factor responsible for manpower shortages in the industry is opportunities in other industries.

Now, I'll cover briefly a summary of the replies of the four internationals that responded to our survey. The Operative Plasterers and Cement Masons International Association of United States and Canada has no past experience, no present application. They figure tool replacement will be negligible. Training will take a wide range of time because of a wide range of variables, such as age of workers, continuity of work and geographical location of the work force. In summary, their President stated, "Metrication would be calamitous to the membership."

The Brotherhood of Painters, Decorators and Paperhangers of America, has no past experience with metrication. By "no" I mean little or no past experience. They have no present application. Conversion would be roughly no advantage to the members. Replacement of tools would cost somewhere between $175 and $250 per member. Training would require a short period for instruction in basic conversion.

The Bricklayers, Masons, Plasterers International Union of America, also has no past experience, and no present application. Advantages: they see some simplification in techniques and simplification of the system itself. Disadvantages: would include retraining, particularly of older workers, a difficult conversion for all, and cost and delays. They feel tools would be a minimal cost. They have an outline of the training. They figure about 40 hours to train craftsmen and 80 hours for foremen. The apprentices would be trained through joint apprentice training committees. Coordination of activities in this field would be through joint meetings of committees. In summary, there wil be initial resistance but adaption in the long run.

The Brotherhood of Carpenters and Joiners of America has no past experience and really no present application. They estimate tool cost replacement at 50 million dollars. They've done a little bit finer breakdown on training and they have added a price to it, or cost of it. Coordinators and instructors will need approximate 40 hours and 1.1 million dollars. The membership will need 20 hours training and 4 million dollars. Manual and visual aids will cost half a million dollars, totaling 5.6 million dollars. The total cost of tools and retraining to the Carpenters and Joiners would be 55.6 million dollars.

The International Brotherhood of Electrical Workers has no past experience, and no present application to any degree or extent. Required replacement of tools would be small, but here I am going to make a point of the difference between

what is required by agreements and what the craftsman or journeyman carries as a convenience to himself and to expedite the installation. The tools required by agreements are a minimal. The tools our craftsmen actually carry are significant. Now, the problem is that reimbursement would probably be limited to required tools only. The rest, unfortunately, would be a voluntary convenience. This would have an impact on any home owner. Even do-it-yourselfers carry these voluntary tools. You would have to almost replace every tool in the country! So I would think we would have to look at required tools and voluntary tools. The cost of replacing required tools would be small but the cost to our members on the job would be significant because they would have to replace any optional tools themselves.

Besides, they would be required in our industry to carry or transport, handle and store, two sets of tools. So I guess if you have a trunk full of tools you would have to have two cars in the future, or a chauffeur or something. We estimate training at about 30 to 40 hours for journeymen. This is a rough estimate by people that are knowledgeable. We have not had the staff or the resources to thoroughly analyze this, which it warrants. We estimate though, roughly, 30 to 40 hours for journeymen, and 50 to 80 hours for instructors. We have no idea how much that will cost. We expect that we could use the existing system to some extent.

Now I would like to go into the impact of metrication on the construction industry. I think a summary of the problems of all the industries discussed could be projected through the industry since there is little or no present application, and no past experience. Imports—existing imports of materials—are insignificant now and very probably will continue to be in the future. There are several reasons for that: weight, bulk, and the related cost of transportation. It would be very expensive to transport an industrialized housing component from England, for example.

Coordination—and accommodation, or adaption, would probably be best for our industry. Conversion, the increased costs and very limited benefits that this industry itself would receive from it, would not be really considerable. To take a little look at the cost, there are two factors: material cost and labor cost. We must consider the combination of increased costs and its impact on site construction activity.

Factors which would increase material costs would be scheduling, dual inventory control, financing of dual inventory control, space required for dual inventory, handling of dual inventory. It would increase production costs because the manufacturer would transfer all his cost in financing to actual material cost and lower productivity to the final product. And if, by some possible way, we would open construction material exports or industry-type exports, it would be additional competition which would force prices up, because of greater demand in that area. But I don't have much faith that we have any major exporting of American construction materials or products coming up.

A factor which could possibly decrease costs of on site construction is imports. Again, I doubt what the impact would be, but we probably could get receptable, fixtures, switch factors, but the total price would be insignificant. And if we experience anything like England where metrication provided the stimulus for technological change, this could decrease cost of labor. But in all probability the industry would be confronted with an over-all increase in cost of material. Factors which would increase labor cost would be lower productivity, wastage and time lost to unfamiliarity with a dual system, inaccuracy and approximation of cutting and installation of materials. The sum of the two would increase over-all probability of direct increase in labor costs.

The impact of the sum of the increases, I don't really believe, would increase the over-all demand for the construction industry. To analyze it a little more in depth—factors which would increase on site construction activities would be: one, the capital investment required by all plants, and two, the equipment needed to make the conversion. These would increase construction activity, all things being equal. Factors which would decrease on site construction activity—and if I missed it before, on site construction activity is primarily my emphasis right here would create, theoretically or economically speaking, a lower demand because of the higher cost of the product in housing in particular.

Consumer confusion. Whether plan on architectural recommendation, the consumer might tend to postpone decisions until things iron out a little bit.

Then there would be a transfer to offsite. Apparently, if again, it follows England's experience because of technological change and standardization, but this, I believe, is more theoretical than we can expect in practical application.

And finally, two more points—obsolescent plants. There is a strong possibility that where a company, a multi-national company, had an obsolescent plant, this plant would not be rebuilt in this country. As long as it is going to be rebuilt, it will be rebuilt in a foreign country. This transfer of plants to foreign countries will be a result of increasing cost and planned obsolescence. Legally required obsolescence, could transfer a significant amount of on-site work to foreign countries.

In summary, I don't think metrication will affect total construction activity because the total construction activity is limited to the cost and availability of long term capital. The priorities of what type of construction will be built are determined through the flow of this capital. In some cases we can sacrifice much housing construction for the conversion of plants, capital investments and plant equipment. So priorities and the availability of long term capital determine what will be built and the volume in which it will be built.

Everyone has touched on it. Training is probably the most important thing in our industry. We have to analyze the capacity of our systems, I mean existing apprentice training systems; how many instructors we have; where we need more availability; and the number of classrooms, teaching aids, textbooks, conversion materials—all will have to be considered in any training program. We have to consider who is going to be trained. How are you going to recruit him? The recruitment would vary with age and with geographical distribution. Now, mechanics in Montana and Nevada are an entirely different problem to bring into a central location for retraining than in the City of Chicago or New York.

Compensation for time and travel. If they are in the rural areas and have to travel to training areas and classrooms, the time they spent would be considerable.

We have to analyze the work force in view of union versus non-union. Here the weak attachment and the degree of attachment to the industry is very significant. Someone who is non-union has a much lesser attachment to the industry. He will work at it one year, not work for another year, and return in a third year. Training might absolutely be impossible, which would decrease available manpower for the industry.

Ability to learn would be based on the factors of age, background and basic intelligence. Again, programs would have to e varied; one flat canned program for everybody would not work because everybody that is in the industry is justly entitled to stay in the industry. So, if you have somebody with some intelligence and others with fundamental intelligence problems, you'll have to design programs to go with each of them. Most examples of training have been one standard program. You need to have a whole range of programs to meet all the needs of the work force.

I have already mentioned the problems with the geographic distribution of the work force. The training of apprentices versus journeymen is much simpler. The apprentices can be folded right into the journeymen's class training and there shouldn't be too much difficulty with this problem.

I have some detailed responses from the people who submitted theirs. I guess maybe for the sake of time I can go right by those. Let me see if there is anything significant before we go by it. I think apprentice training has been pretty well covered in the summaries there and really I couldn't add anything by detailed response of trainees.

Impact on craftsmen of the metrication program. There would be a strong possibility of lost income due to delays in scheduling. Because of the requirement of suppliers to carry dual inventory, producers producing dual inventories, delivery and shortage of material could exist. Jobs could be postponed or delayed. There would have to be some inclusion in agreements negotiated to the effect that there be no loss of time due to scheduling materials on site.

Compensation for retraining, mentioned before. Some people in our rural areas or far western areas have to travel far to reach training headquarters. They would have to be compensated for both time and transportation.

Actual on job techniques. We would have increased stress and responsibility coupled with lower productivity. Quality could diminish because of approximations. Conversion would be to 300 meters. The burden of dual thinking, thinking in both systems, would decrease output.

Tools. I have mentioned voluntary requirements, storage, handling, and dual transportation. Many of our people, older people who are either unwilling or unable to learn could be forced out of work. Many of our younger people would be forced out of the work force also. Entry into our work force would be restricted, especially in areas where we are working with the disadvantaged people of our inner cities. It would be an extra burden on them to pick up extra training.

And then we get to an area of safety. If there is any—and this is more or less related to my own industry—if there is any influx of electrical equipment that is marked with instructions or directions in foreign languages, there could be safety problems. From people I know who work on foreign motors, I learned that they mark their armatures and loads differently. Their terminology and their boxes are also different. It could be extremely dangerous to some of our craftsmen in the field. We have to protect against that type of problem.

Since our industry is so closely related to the cyclical sways of the National economy, I feel that maybe a minute or two to examine the impact of metrics on our over-all economy would be worthwhile. Time and time again I've sat on the Metrication Advisory panel for four or five meetings; I've seen people come up here, I believe, somewhat blinded by the glare of publicity and over-all logic of the metrication system. They say it is inevitable. They say, in spite of great cost in their own particular industries they will adapt to the change. I not only question the inevitability; I question the possibility of converting a one trillion dollar economy in ten years. I think it distorts perspective to compare it to England, which is about a hundred billion dollar economy. The entire free market, the Common Market, only has about a 350 million dollar economy. So you are really comparing watermelons and peas, when comparing our trillion dollar economy to that of England.

It took—I gather from the lumber industry whose spokesmen are here—five years to agree on the standard for a two by four. One 2 by 4. (Dannet) touched on it very briefly this morning. Our economy has to be at full employment with stable prices if this is going to be in the least bit possible.

Imagine this situation in 1969 and '70. You are in the fourth or fifth year of a planned conversion, with a large scale investment already made, a capital shortage, equity pressures, low profits and your unemployment is increasing. Foreign markets would be opened up into our markets because they already could achieve cost reductions to economies of scale with existing equipment, while we would be in the same process of adding cost to our products for exporting, which would mean an increasingly unfavorable balance of trade. Our demand schedules for every product would shift negatively. It would require a reordering of all our priorities, such as social, medical, education, housing and pollution. The consumer would pay for higher prices across the board whether the government assisted through tax incentives, or whether they let the chips fall where they may. There would be mass consumer confusion, and the impact on the worker has been already stated.

In general I feel that we must stress the economics of this situation. If we get into any problem either of deflation or inflation it could make 1932 look like a cakewalk. Any questions? [Applause.]

Mr. TROWBRIDGE. Thank you very much, Tom.

We are open for questions. I see one hand raised.

Mr. WEINLEIN. I was curious. The implementation of the training and apprenticeship programs—I just asked around the country some of our people, whether any of them are capable of instituting this, and I didn't find one.

I was wondering whether in the construction industry, whether the other crafts had apprenticeship programs or apprentice teachers or trainers that are capable of even giving instructions.

Mr. HANNIGAN. In all these cases here we had to double the time, almost. Everybody has had to double the time for training instructors, because they not only had to deal with the technicalities of making the conversion, they had to deal with the psychologies of conditioning a person's mind to accept the conversion. It is not going to be an easy matter and you are just not going to be able to give them the mathematics and the computations. You have to condition them. So the instructor will have to have that type of an area.

In our area in particular the electronics industry, one confusion that could come about right now is wire size. It is, as you know, a circular mil. For convenience, we've taken one-thousandth of an inch as a circular mil. The diameter of a wire size gives you the circular mill area. That, in a foot of wire, determines the resistivity or conductivity of wire. It is the key to all electrical computation. In the future it could be very easily confused with any converted factor. It would probably use the same name, circular millimeter.

So in one case, where you would be using exactly the same terminology, it could be easily confused with the terminology saying circular mil meaning millimeter and circular mil which right now means an inch by definition. You'd have to run through the whole gamut and it won't be a simple process, but I am sure anything is possible.

Mr. TROWBRIDGE. And I'd add to what Tom says, that this has been stressed in other sessions, that you might put it under the classification of a loss of experience. The fact that you cannot visualize the mass of a thing in kilograms—I might ask you how much your mass is and you couldn't give it to me unless you mentally divided. Or if I asked you how many centimeters there were in the width of this table you would have to do a quick calculation in feet and then back into centimeters. So it is this loss of experience which you are dealing with here and it is part of any training program and may be classified under this loss of efficiency problem.

I saw another hand up there.

Mr. GOTTLEIB. Tom, I have a question related to the fact that I am a do-it-yourselfer, and I am just curious about the effect on tools. I wouldn't have to change very many tools in my own workshop. I would have to change the rulers and the T-squares and so on. But the hammers, pliers and wrenches that I use, and have used for 30 years would be the same.

This brings me to the question of painters——

Mr. BURKEHARDT. You're wrong. You are going on the wrong assumption because your wrenches are made to inch sizes. The quarter inch wrenches fit——

Mr. GOTTLIEB. I am very stupid. I take a wrench and put it up to the——

If you have an adjustable wrench, you adjust it to the size of the nut or the bolt that you are working with. But if you don't have an adjustable wrench and you put it on a bolt and it will ruin it.

Try using your American size wrenches on a bicycle made in Germany, for example. These tools do have to be replaced. Sure they can be used for some uses where there is sloppiness and we don't have to put too much pressure on them and so on. But don't go on the assumption that that mass of tools you have in your basement, or that I have in mine, or that our mechanics carry will not have to be replaced. They will have to be replaced.

Mr. TROWBRIDGE. Would the people who just spoke identify themselves for our record.

Mr. HANNIGAN. It would vary with the degree of sophistication of the home shop. I mean the socket sets, the drills, taps, squares. If its just an average man, getting by with a hammer and saw in the home shop, there wouldn't be any trouble. But the people who tinker around with cars would find themselves wiped out as far as socket sets go.

Mr. WEINLEIN. Let me ask you about the painter——

Mr. BURKHARDT. That was the maintenance painters, and a lot of plants supply their own tools and have to do a lot more of this painting. Also there are glazers. There are some cost estimates for glazing, and some contracts specify that a glazer will supply his own tools, and sometimes he won't. So just by calling them painters, you know, it doesn't mean we are talking about painters. We are talking about glazers and maintenance people and industrial people.

Mr. HANNIGAN. I might have oversummarized there.

Mr. BURKHARDT. In the context it meant maintenance painters, and it was from a survey of general representatives who handle our industrial people.

Mr. MENSCHING. I was wondering in your field, Mr. Hannigan, if you see any loss. What about experienced men, per se? In my industry I see a lot of my top mechanics are not going to accept this and you are not going to make them accept it because of their ego, or what have you. They know they are good mechanics and to accept it, an entirely new concept, they'll say, "get lost" and leave the jobs, maybe.

What do you think would be the impact on a lot of our workers throughout the industry where we have these top mechanics? Are we going to take a chance on losing them by any conversion of this sort?

Mr. HANNIGAN. I don't think we would lose them. I mentioned there would be a loss in some parts of the work force because of the inability to learn. But you mentioned the unwillingness to learn that I referred to. I don't think we would lose anybody in the work force who is keyed to the industry. The most productive leaders, top people in the sense of being right in the most productive age, maybe between 30 and 40, or 25 and 40, really productive and knowledgeable persons. I doubt if they would leave. They would make the adaption. You would have to base any conversion on their cooperativeness.

Mr. TROWBRIDGE. We've got time for one more question. Tom. In the interest of staying on schedule we'd better get with it. Your name again, sir?

Mr. TINKCOM. Jim Tinkcom, United Brothers of Carpenters.

In response to your figure of 50 million, this was taken—we have a membership of 800,000 people, so this is a very modest breakdown of $60 per man for

simple measuring tools and then the fixed-sized wrenches and so forth. We, of course, give them a much higher breakdown to that section of our trade, the millweights, because they were much more in the decision in regard to apprenticeships.

We have been having seminars at the national office. We are concluding the last one next week. We are bringing our apprenticeship instructors in in groups of 50 from the Nation to study the problems of teaching apprentices. Since this metric thing came up, we did ask those instructors who are in the field how they felt the effect would be in the classrooms. Of course, they immediately felt that we were already in the metric system, that it would simplify the system of teaching carpenters arithmetic, but they felt that since we were on 60 inch and 48 inch modules, to have a dual scale of all the fractions in inches, plus fractions of millimeters and centimeters we would end up in absolute chaos.

They felt that by osmosis over a period of years it could be accomplished. But, first the material would have to be changed to the metric, and then the people could learn to work with it, but in our present modular system of building that it would be chaos.

Mr. TROWBRIDGE. Thank you very much.

ITEM 1

(By Elmer R. Weaver, Former Chief of Gas-Chemistry Section, National Bureau of Standards)

Proposed legislation is based on MA, at least in major part, and (MA 137) says:

"If the U.S. decides to go metric in a coordinated program as the British are doing, what lessons can be gleaned from their progress? Britain, is, like us, an advanced industrial nation and one with which we share many common traditions. At least to this extent their metrication effort serves as our pilot program."

If pending legislation passes and a Conversion Board is given a year or more to prepare a program, we will then be in the stage of the approach to metrication that Britain was in 10 or 12 years ago, and even if we do not pledge to follow their program as a pilot, we may profit by considering how it is working out in that country.

Unfortunately, there is little information available on this subject. What we do have may be considered under two heads, (1) Education, and (2) Industrial conversion especially in the building industry.

(1) EDUCATION

Perhaps the only point on which everybody can agree is that if the elimination of official (legal) units now familiar to and "predominately but not exclusively" used by all Americans, is to be successful, it will require that we learn the significance of several already official SI terms with which we may not now be familiar. MA tells us what they are.

On page 88 we find: "Through newspapers, magazines, radio, television and other media, the British Metrication Board is informing people about kilograms, meters, degrees, celsius, and a few other metric units they are likely to encounter in everyday life, trusting them to pick up on their own any more technical details they may desire to know."

On page 137 appears: "For most people it is enough to become accustomed to the gram, the kilogram, the meter, the liter and a few other units they need for everyday use. Repeated surveys have indicated that the British public is becoming increasingly aware of metrication and more favorably disposed to it. According to a public survey completed early this year, public education has already been fairly successful. About ⅔ (of the people questionable) knew that a kilogram is a measure of weight, but only ⅔ of these knew that it was more than a pound."

If the survey was made, as it may have been, in the form of true or false answers to the two statements:

1. A kilogram is a unit of weight.
2. A kilogram is heavier than a pound.

probability indicates that 50% of a sufficient number of people who knew absolutely nothing about the subject, would answer each question correctly and 25% would answer both correctly. Actually, it is reported than 26.6% gave correct answers to both statements, only a shade above an indication of complete ignor-

ance. The corresponding figure for statements that a kilometer measures distance and is shorter than a mile was 50%; and for the statement that a liter measures volume and is greater than a pint, it was 44.4%.

The poll was taken about 6 years after metrication was decided on and 2 or 3 years after the all-out effort to educate the public was begun. In the two lists given of what ordinary people should be taught, there were five specific items, meter, gram, kilogram, liter and °C. Meter and kilogram were in both lists, not an embarassingly large assignment of homework even with the suggestion that individuals might like to extend their knowledge somewhat beyond it.

I believe that the casual reader of MA's discussion of the British educational effort will get and remember the impression that it was a success, when any examination of data reported in specific terms must show the contrary. I also believe that this is typical of the misleading character of the whole text of MA.

ITEM 1. PART 2. INDUSTRIAL CONVERSION IN THE BUILDING INDUSTRIES

The text of MA under the heading *Construction* p. 127 will be easier to read in the original text than in the copy I would make if I was not sure the original is available to you. I will only comment on it.

According to MA the construction industry led the way in metrication by adopting "standardizing dimensions." This meant simply a decision to use working units in the building trades equal to the feet and inches that have been used for generations all shortened in the ratio 25:25.4.

This set the pattern for other major industries, steel, ceramics, plastics, etc.

In the summer of 1971 the conversion to the reduced scale was reported in MA as well underway, and industrial conversion was expected to be substantially completed in 1972.

Almost by accident about Aug. 15, 1973, I was informed by an attache of the British Embassy that "carpenters and joiners in Britain" are still adhering to the old foot-inch scale and will do so for 20 years. Unless the major manufacturing industries that supply the builders are going to send incompatible parts to their principal customers, which is incredible, they must abandon their plans to "convert" to the reduced scale until the builders follow instead of lead the metrication parade. They appear now to be unwilling to do this.

The significance, to us, of this is plain. The basic reason assigned for our going metric is to facilitate international trade by making industrial products compatible all over the world. If our pilots, the British are now unwilling to go through with the plans so cheerfully welcomed by MA the whole case of metrication that MA presented, always more visionary than reasoned, seems to collapse.

ITEM 2

During what the "Metric Studies Group" called their "substudies" on which MA is said to have been principally based, a figure of 58 billion dollars was at one time arrived at as the probable cost of metrication for the nation, but this figure was not included in MA, the general report to Congress. Nor was it replaced by any other estimate.

Even this figure covered only direct costs of preparing to make, introduce and distribute products newly dimensioned in the S1 system. In addition to the cost of new tools and machinery, it included the cost of new commercial measuring equipment, the training of personnel and the problems of inventory and storage that will result during the conversion period from the near-duplication of products for the same uses, that are not quite interchangeable.

The only specific figure reported for conversion costs was the estimate that "appropriations for the Department of Defense over a 30-year conversion period would have to be increased by a total of $18 billion, most of it, about 75% during the first 10 years" (MA 112).

After verification, Item 2 should be attributed to George Lovell, 7401 Dartmouth St., College Park. Tel. 277-1718.

ITEM 3

Item 2, the 58 billion dollar estimate made in the "Substudies" did not include the enormously greater loss to the general public from "orphanage."

The total cost of "orphanage has been estimated by a retired Superintendent of Construction for a major engineering firm as more than a trillion dollars. The estimate is based on the difference between the cost of mass produced

products needed for replacement and repair and the cost of the same items made to special order or personally contrived by workmen on the job, plus the loss from premature depreciation and the abandonment of property, during the first 300 years after conversion.

Item 3 was computed by A. R. McMillan,, Box 745, Alexandria, Va. 22313. Telephone TE6-3462.

McMillan did this job entirely independently and as I understand without contacting anybody officially concerned. He is an engineer of extensive experience who figured out entirely for himself what would happen when official sanction was withdrawn from our "customary" units of measurement.

QUESTIONS OF THE COMMITTEE AND MR. HANNIGAN'S ANSWERS

Question 1. The proposal that the United States convert to metric measurement and weights was based on two hypotheses. First, that the United States is slowly but surely moving toward metric usage and second, that it would be preferable that this movement be done on a coordinated and comprehensive basis. Do you agree with these two central findings of the Metric Study Commission, and if not, why not?

Answer 1. We are in total agreement that metric usage is increasing in the United States. However, it is important to note that usage of the customary units is increasing worldwide at a greater rate than metric units. We agree that a coordinated plan is necessary to manage the increasing use of the metric system, but feel there is no evidence to warrant a national commitment to exclusive usage, predominant usage or merely to the extent that is economically and socially practical. In brief, we presently do not have sufficient information to make practical decisions regarding the role of the U.S. Government in metric conversion, the degree of conversion or time of conversion, but we obviously need a plan regarding coordination of the increase in metric usage.

Question 2. Many companies are moving toward adoption of metric measurement without Federal leadership. They include such giant firms as IBM, General Motors, Xerox, Caterpillar Tractor, Honeywell, Ford, etc. Inasmuch as the workers for these firms are having to adjust without Federal help, does the AFL–CIO think it would be equitable for the Federal Government to assist workers in other industries or firms or would the AFL–CIO also propose assistance to the first group?

Answer 2. First, I must stress the distinction between the need for assistance for multinational corporations and the need for assistance for the employees of multinational corporations. Second, much work needs to be done before enlightened decisions can be made. The AFL–CIO Resolution on metric conversion states that the "board would conduct its research on still unresolved problems associated with metric usage including, but not limited to, the impact on workers and on different occupations and industries. . . ." It is our general feeling that any form of assistance must be justified in some manner of form. We believe giant multinational corporations, with their enormous profits, capital, resources, managerial and technical ability, are entirely able to take care of themselves regarding metric conversion. Therefore, it would be difficult to justify any direct assistance for multinational corporations. However, I can visualize the need for various types of assistance for the employees of multinational corporations. Equity requires that collective bargaining settlements should not be reduced by the cost relating to metric conversion such as tools and retraining. It is entirely possible that special unemployment and job placement assistance, relocation allowances and assistance, technical assistance for local unions and education and retraining opportunities for workers will be necessary.

Question 3. If the Federal Government were to assist workers who had to purchase their own tools or equipment, how would you propose to differentiate between ordinary replacement costs and conversion costs?

Answer 3. The technical details such as this must also be worked out by the Metric Monitoring and Assistance Board. Generally, the amount and type of assistance for tools will probably be determined on an industry-by-industry, or in some cases, an occupation-by-occupation basis, or in some circumstances, on individual cases; each situation is different and requires a different response.

Question 4. If assistance were extended to workers, why would this not be a precedent for assistance to other groups such as small business, big business, etc.?

Answer 4. The AFL–CIO Resolution on metric conversion expressed itself very clearly regarding its concern of the increased cost to consumers, impact on society, economy dangers, anti-trust violations, and its effect on small businesses. We fell that Congress must be fully aware that there is no cheap method to convert to the metric system of weights and measures and that this nation will be involved with the problems associated with metric conversion for the next 30 to 50 years. Our resolution attempts to point out the many problems and costs associated with conversion. We believe that, in order to maintain a strong economy, all individuals and organizations adversely affected and unable to help themselves, must be provided with whatever assistance is necessary for them to continue as productive members of society.

Question 5. Does the AFL–CIO have any documentary evidence to show that conversion by companies which have decided to convert to metric usage has imposed economic or social hardship on their workers? If yes, please specify?

Answer 5. The IBEW does not have any documentary evidence showing that conversion to the metric system has imposed economic and social hardship on our members. On the other hand, common sense supports our contention that retraining for some workers will be difficult; for others, impossible; that dual thinking will result in increased responsibilities for job strain; that thousands of workers will be faced with greatly limited opportunities or forced out of the labor market. The extent of, and proper response to these problems, will be responsibility of the Metric Monitoring and Assistance Board.

Question 6. In view of organized labor's concern about the effects of metric conversion, is this issue the subject of labor-management discussions and why can this issue not be taken care of in regular collective bargaining negotiations?

Answer 6. Organized labor is proud of its record in collective bargaining. History has proven that collective bargaining has been enormously successful in meeting the needs of organized labor. However, in the case of costs relating to metric conversion, collective bargaining may not be entirely appropriate since it is a management oriented proposal. Before entering negotiations, management evaluates the situation and usually develops a total cost of settlement range which it feels to be reasonable. If the cost assigned to the various aspects of metric conversion relating to the work force is included in this settlement range, it is clear that the direct benefit to its employees is reduced by that amount. *Simplified example*: Instead of getting a 15¢ per hour increase, they get a 10¢ per hour increase with 5¢ to be used for tools, retraining, etc. This, we feel is inequitable because metric conversion is management initiated and directly benefits management and not the employee.

Question 7. Could you explain in greater detail how the compensation plan would work to avoid having the American taxpayer pay for ordinary costs and to ensure the most efficient, inexpensive ways of conversion?

Answer 7. The impact of costs is one of our objections to metric conversion. Major multinational corporations generally will benefit while the American taxpayer and consumers will pay the entire bill one way or other. However, we feel that given major tax reforms, as proposed by the AFL–CIO, the impact on the American taxpayer as a result of the metric assistance programs will be minimized. The most economically and socially responsible types of assistance will be recommended by the Metric Monitoring and Assistance Board. Again, it is important to stress there is no inexpensive way of metric conversion.

Question 8. The resolution states that the metric monitoring board would minimize the adverse effects resulting from increasing metric usage. What would you estimate the annual cost to be?

Answer 8. At present, I have no way of estimating what the annual cost would be. However, I feel there is sufficient expertise and experience available to the Committee to prepare a budget for the organization and start-up costs associated with the first year's operation of a Metric Monitoring and Assistance Board. I will be glad to assist you in any way you feel is necessary. Also, I feel many existing programs could be modified, expanded and their respective budgets increased to achieve the many goals of the Metric Monitoring and Assistance Board. Finally, the Metric Monitoring and Assistance Board should be authorized to carry out research mission by awarding grants to responsible non-profit organizations.

Question 9. The AFL–CIO resolution on metric usage charged that the study conducted by the Metric Study Commission is inadequate and deficient. Please explain why.

Answer 9. In response to this question, attached is: (1) my testimony before your Committee on March 1, 1972, plus other material to be determined later; (2) comments of Congressman Gross on the Status of GAO report on the U.S.D.C. Metric; (3) an excerpt from "A Metric America—A Decision Whose Time Has Not Come," by George C. Lovell, published in the March 9, 1972 Congressional Record; (4) comments on the U.S. Metric Study by John T. Benedict, Manager, Technical Information, Engineering & Research Office, Chrysler Corporation; and (5) comments on the U.S. Metric Study by Elmer R. Weaver, former Chief of the Gas-Chemistry Section, National Bureau of Standards.

Question 10. How long would this board operate? What would prevent this board from being merely another means to delay interminably the implementation of a workable conversion plan?

Answer 10. The board would operate as long as necessary to achieve its purpose—the legislation. It would clearly establish, as policy, that it is not the intention of the legislation to delay interminably recommendations on increasing metric conversion. Here, it is important to note that it should not be the goal of the Metric Monitoring and Assistance Board to develop the conversion plan. Our resolution requires that the board remain neutral regarding the metric conversion until sufficient evidence is available to make a decision. The fact that our resolution requires the board to report every year to the President and Congress of its research and on the status of metric usage would also minimize delays.

Question 11. In the AFL–CIO's statement, Mr. Peterson consistently referred to workers who are "adversely" affected by conversion to the metric system. How is it possible to isolate this group of individuals from those workers who would be adversely affected by any natural labor developments, such as workers obsolesence in high-technology industries, automation, etc. and hence eligible for the special assistance proposed by the AFL–CIO?

Answer 11. The problems we admit are complex and enormously difficult. We do not have the answers, however, we feel we have serious and reasonable questions. This is why we are suggesting the establishment of the Metric Monitoring and Assistance Board.

Question 12. If $2,000 is not an adequate ceiling, what would you suggest as reasonable?

Answer 12. We feel that there should not be a ceiling on this type of assistance. The worker should be reimbursed for all tool replacement costs he can substantiate.

Question 13. How many industrial countries which have converted recently have extended subsidies to workers who own tools and equipment and small businesses?

Why should Great Britain's experience be inadequate to settle the question of Federal assistance?

Answer 13. We do not have the answer to this question, but feel is should be readily available. We must not compare ourself totally with other countries. Our economy and society is different than any other country in the world. Therefore, we must learn from their experiences and adapt them to the particular needs of our society.

QUESTIONS OF THE COMMITTEE AND MR. PETERSON'S ANSWERS

Question 1. The proposal that the United States convert to metric measurement and weights was based on two hypotheses. First, that the United States is slowly but surely moving towards metric usage and second, that it would be preferable that this movement be done on a coordinated and comprehensive basis. Do you agree with these two central findings of the Metric Study Commission, and if not, why not?

Mr. PETERSON. We do *not* agree with the hypothesis that the United States is moving slowly but surely toward metric usage. There is fragmentary evidence of increasing use of metric measurement, but there is absolutely no convincing nor conclusive evidence that a slow but sure trend exists.

Furthermore, the question itself is ambiguous. What is a slow but sure trend? Is it a trend to exclusive use of metric measurement? Is it a trend to a predominant but not exclusive use of metric measurement? Is it a trend to a dual system of measurement with traditional and metric units used simultaneously?

It is evident that the question underscores the point made in the AFL–CIO resolution that "There are too many unanswered questions and there is insuffi-

cient evidence (1) to support an official U.S. government policy of facilitating and encouraging metric conversion; (2) to support a decision about the extent to which the metric usage is necessary and practical; (3) to support a decision about the degree to which metric usage should be exclusive, predominant, or complementary to existing measurement methods; or (4) to support a decision about some appropriate conversion period."

Therefore, we believe that a voluntary approach is the best way to deal with the issue of use of metric measurement units. We oppose any coordinated and comprehensive program dealing with use of the metric system which relies on compulsion rather than on voluntary participation and voluntary cooperation.

Question 2. Many companies are moving towards adoption of metric measurement without Federal leadership. They include such giant firms as IBM, General Motors, Zerox, Caterpillar Tractor, Honeywell, Ford, etc. Inasmuch as the workers for these firms are having to adjust without Federal help, does the AFL–CIO think that it would be equitable for the Federal Government to assist workers in other industries or firms or would the AFL–CIO also propose assistance to the first group?

Mr. PETERSEN. Federal assistance should be available to all workers affected by adoption of metric measurement—without regard to the size or industry of their employer. If some workers wrongly are denied metric adjustment assistance, that is no justification for denying such assistance to other workers who should be getting assistance.

Question 3. If the Federal Government were to assist workers who had to purchase their own tools or equipment, how would you propose to differentiate between ordinary replacement costs and conversion costs?

Mr. PETERSON. I think a simple affidavit by the worker concerning his additional costs of conversion to metric tools or equipment or additional costs of duplication of tools should be sufficient.

Question 4. If assistance were extended to workers, why would this not be a precedent for assistance to groups such as small business, big business, etc.?

Mr. PETERSON. In a system of voluntary use of metric measurement units, business, whether big or small, will make its decision on use or non-use of the metric system as a matter of self-interest, whereas workers will not have such freedom of decision. It is the workers' lack of freedom which makes metric adjustment assistance essential for workers.

Let me add a comment about S. 100.

Section 17 deals with tax assistance to business through speeded-up depreciation. We regard this accelerated depreciation as unnecessary and regressive in its effects. Furthermore, it contributes to additional undermining of a tax base already eroded in 1971 by the 7 percent investment tax credit and by accelerated depreciation amounting to a 20 percent tax write-off for corporation spending on machinery and equipment.

If subsidies are necessary to achieve some national purpose we believe such subsidies should be made directly and openly with full public understanding of the purposes of the subsidy and of the costs and benefits of the subsidy. This is certainly not the case as proposed in Section 17(a), which opens up a regressive tax loophole of gigantic proportions.

It is very strange and very unfair—it is outrageous—that S. 100 in its "policy and purpose" Section 3, page 7, line 17, declares that businesses and individuals may get *"limited assistance"*—limited for workers to $2,000—while big corporations will get billions and billions of dollars through accelerated depreciation.

Question 5. Does the AFL–CIO have any documentary evidence to show that conversion by companies which have decided to convert to metric usage has imposed economic or social hardship on their workers? If yes, please specify?

Mr. PETERSON. To get this information would require an extensive survey of thousands and thousands of local unions, because many problems such as those associated with metric conversion do not come to the attention of the international union headquarters.

Question 6. In view of organized labor's concern about the effects of metric conversion, is this issue the subject of labor-management discussions and why can this issue not be taken care of in regular collective bargaining negotiations?

Mr. PETERSON. It is difficult to establish the extent to which the effects of metric conversion are the subject of collective bargaining, but it is obvious to us that the costs will fall on the workers, because money allocated for metric conversion compensation is not available for wages or fringe benefits. The employer is relatively indifferent to the distribution of the money in the package

to which he agrees, but for the workers any part of the package committed to metric compensation is lost in terms of wages and fringe benefits.

Question 7. Could you explain in greater detail how the compensation plan would work to avoid having the American taxpayer pay for ordinary costs and to ensure the most efficient, inexpensive ways of conversion?

Mr. PETERSON. This question assumes some clear distinction between ordinary costs and extraordinary costs. As in my answer to Question 3, I suggest a simple affidavit on a simple form requesting reimbursement for additional costs of new or duplicate tools.

However, the problems listed in the AFL–CIO resolution suggest that a compensation plan would require very lengthy and careful planning. The Metric Monitoring and Assistance Board that we propose would have to prepare a compensation plan, and such preparation would necessarily involve consultation with representatives of labor.

Question 8. The resolution states that the metric monitoring board would minimize the adverse effects resulting from increasing metric usage. What would you estimate the annual costs to be?

Mr. PETERSON. The fact that it is necessary to ask this question suggests to us that there has not been enough research to justify metric legislation like S. 100. We have no precise estimates of the costs of reimbursing workers against all the costs of metric conversion. The National Bureau of Standards report, "A Metric America," contains an estimate of $60 billion in costs to workers and consumers.

Question 9. The AFL–CIO resolution on metric usage charged that the study conducted by the Metric Study Commission is inadequate and deficient. Please explain why.

Mr. PETERSON. We believe legislation now to hasten adoption of the metric system is premature because it is the result of a poorly conducted study of the feasibility of conversion. This study, "A Metric America : A Decision Whose Time Has Come," by the National Bureau of Standards in the U.S. Department of Commerce, is the result of the 1948 enactment of Public Law 90–472 which called for an inquiry into both the beneficial and detrimental effects of conversion to the Metric System.

The National Bureau of Standards, which handled the inquiry for the Commerce Department, failed to study the economic ramifications of the proposed conversion to workers, industry, consumers and the American economy in general. Instead, the study committee, on which labor was vastly under-represented, concentrated on how conversion could be most easily accomplished.

In addition, the committee report, forwarded to the Congress in 1971, is notable for what it did not report as well as for its timetable for conversion.

It did not report, for example, the finding of labor members of the committee that, instead of the "widespread enthusiasm" for conversion the committee reports there is really widespread indifference to such a change.

It did not report on some of the strong objections brought by labor representatives and others to the recommendation that costs incurred by conversion be allowed to "lay where they fall." These costs would include retraining in many fields, purchasing of new metric tools and costs to the consumer.

This is why we are calling for an independent Metric Monitoring and Assistance Board to collect and analyze information about the use of metric measurement, to evaluate the costs and benefits of metric usage, and to conduct research on many still unresolved problems associated with metric usage, including but not limited to the impact on workers and on different occupations and industries, possible increased costs to consumers, the impact on society and the economy, dangers of anti-trust violation, effects on small business, the impact on the U.S. international trade position, the appropriateness of using federal procurement to affect conversion to the metric system, the proper conversion or transition period, and effects on national defense. The board would report every year to the President and Congress on its research and on the status of metric usage and would recommend whatever actions are necessary to minimize the adverse effects of metric usage.

Question 10. How long would this board operate? What would prevent this board from being merely another means to delay interminably the implementation of a workable conversion plan?

Mr. PETERSON. This question seems to be directed at the AFL–CIO proposal for an independent Metric Monitoring and Assistance Board. We see no need to put any limit on its existence. If "a workable conversion plan" should ultimately

become desirable, there is nothing in our proposal to prevent implementation of such a plan, but I want to repeat our conviction that at present there is a serious lack of evidence to support a decision by Congress to commit the nation to an official policy of facilitating or encouraging metric conversion.

Question 11. In the AFL–CIO's statement, Mr. Peterson consistently referred to workers who are "adversely" affected by conversion to the metric system. How is it possible to isolate this group of individuals from those workers who would be adversely affected by any natural labor developments, such as workers obsolesence in high-technology industries, automation, etc., and hence eligible for the special assistance proposed by the AFL–CIO?

Mr. PETERSON. Adverse affects resulting from conversion to the metric system could be certified by affidavit of the affected workers and/or labor unions representing affected workers and/or employers of affected workers. This is a logical way to determine what workers are eligible for special adjustment assistance.

Let me repeat my earlier comments about achieving some national purpose. We believe that if the nation adopts some national purpose, and if some individuals will be adversely affected by movement toward this national purpose, then such persons should receive adjustment assistance directly and openly with full public understanding of the purposes of the assistance and of the costs and benefits of the assistance.

Question 12. If $2000 is not an adequate ceiling, what would you suggest as reasonable?

Mr. PETERSON. $4,000, but let me make it clear that this figure represents only our judgment with respect to reimbursement costs for newly required metric tools, and it does *not* include the costs of special unemployment and job placement assistance, relocation allowances and assistance, technical assistance, and education and retraining opportunities for workers, including financial assistance for apprenticeship training programs. We are concerned about the full range of adjustment problems that would face workers in conversion to metric measurement.

Question 13. How many industrial countries which have converted recently have extended subsidies to workers who own tools and equipment and small businesses?

Why should Great Britain's experience be inadequate to settle the question of Federal assistance?

Mr. PETERSON. We have no information about the experience of other countries in extending subsidies and adjustment assistance to workers and small businesses adversely affected by metric conversion. I think this information certainly should be collected and carefully analyzed by the Metric Monitoring and Assistance Board that we propose. We have received informal oral reports from some British trade unionists of unfortunate and negative experience of workers in Great Britain in connection with metric conversion, but we have not received any formal reports on this subject.

QUESTIONS OF THE COMMITTEE AND MR. EPSTEIN'S ANSWERS

EPSTEIN. I disagree with the conclusions drawn in the U.S. Metric Study. They do not follow from evidence presented there. The United States is now predominantly on the basis of customary measurement. Metric measurements are also used in the United States. However, no one claims that the United States will ever become exclusively metric. For example, efforts to introduce the decimal watch never took hold, nor did the decimal calendar ever go into effect. Even the U.S. Metric Study states on page 48: "Some measurements and some dimensions would never need to be changed. It would be preposterous ever to tear up all our railroad tracks just to relate them to some round-number metric gauge." If this is true in the case of railroadtracks, the likelihood applies to housing and the tremendous accumulation of both capital and consumer goods. This indicates clearly that we shall always have two main systems of measurements within the United States. Accordingly, the argument of the Metric Study that "without a plan the United States would experience all the difficulties of dual inventories, dual education, dual thinking, dual sets of tools and dual production," falls to the ground. Planning will not eliminate these problems because a dual system is inevitable.

There should be a planned approach to the problems arising from the introduction of the metric system. That is the reason why the AFL–CIO favors the es-

tablishment of an "Independent Metric Monitoring and Assistance Board. However, it is opposed to Congress passing "any legislation which would commit the federal government to an official policy of facilitating or encouraging metric conversion."

The very fact that companies expected Congress to pass legislation favoring conversion to the metric system resulted in some of the large corporations adopting metric measurements. This is a self-fulfilling prophecy. Without doubt, if the procurement agencies of the federal government adopt metric measurements, it would compel many companies to follow suit.

I feel that not enough attention is being paid to the cost involved in metric conversion. The Study admits that "few of the groups from whom benefits and cost data were solicited were able to furnish them." From our experience with "over-runs," we know that the costs will be greater than anticipated.

There is evidence that there is nothing to prevent an industry from adopting metric standards. The above-mentioned report states: "About 15 years ago, the major U.S. drug manufacturers changed their internal operations and most of their products to metric. They did so with dispatch, and they found it surprisingly painless." The conclusion I draw from this experience is that those industries which find it advantageous to convert can do so on their own without forcing other industries in the same direction. The Metric Monitoring and Assistance Board should study each situation on a case by case basis, and come up with a proposal of how best to deal with it. A clear distinction should be drawn among the needs of business, manufacturing industries, construction, transportation and farming. We should also bear in mind the effects upon various groups in our society: multinational corporations, exporters, importers, domestic industry, small business, workers, housewives, consumers in general.

There is an impression that the countries which have now gone on the metric system have actually ceased to use non-metric weights and measures. In fact, "metrication" has not gone as well in Britain as is claimed by some of the proponents of the metric system. The British Metrication Board in its 1972 report complained that "there was also a loss of momentum and a loss of confidence in the attainability of the 1975 metric objective." It continues with the following statement: "The Confederation of British Industry stated in June 1972 that 'there was a noticeable slackening in the move towards metrication in many sectors of industry.'"

In the discussion of the metric system, there is the implication that it is obviously superior to the customary system and that it will make measurements more accurate, but the U.S. Metric Study itself admits: "Not a few of the common arguments are demonstrably false, even a bit frivolous. It is said, for instance, that the metric system, because it has roots in science, somehow makes measurement more accurate. But measurement depends entirely on the accuracy of the measuring tools and the skill of the person who uses them." Moreover, we should not make light of the fact that the customary system was "based largely on folkways." Folkways and common sense are as important as abstract theory (which is often limited and false). They are inescapable facts of life. Finally, the Study confesses in answer to its own question: ". . . which of the two major measurement languages is better? This is not an easy question to answer, because each has intrinsic or practical merits."

Despite the claimed advantage resulting from the fact that metric is based on the decimal system, the Study itself has something good to say about the customary system based on powers of 2 and 12: "Nevertheless, intuition easily grasps binary fractions—i.e., halves, and halves of halves. The number 12 also has a special practical virtue in doing arithmetic. It is conveniently small, and it is divisible by 2, 3, 4, and 6—twice the number of divisors of 10."

There is also confusion between metric conversion and standardization. The British have gone in for the metric system, but they have not yet standardized electrical plugs and receptacles. A good deal could be gained by concentrating on standardization rather than conversion to the metric system.

Senator STEVENS. Our last witness this morning is Mr. Frederick Williford, director of government affairs, National Federation of Independent Business, accompanied by Mr. John Motley.

Mr. Williford, would you proceed with your statement?

STATEMENT OF FREDERICK WILLFORD, DIRECTOR OF GOVERNMENT AFFAIRS, NATIONAL FEDERATION OF INDEPENDENT BUSINESS; ACCOMPANIED BY JOHN MOTLEY

Mr. WILLIFORD. Mr. Chairman, in light of your time constraints, I have my statement summarized, and I request permission that the full statement be placed in the record.

And in further recognition of your time constraints, I am going to summarize the summary. So if possible, I would also appreciate having my full summary in the record.

Senator STEVENS. Proceed as you suggest.

Mr. WILLIFORD. Very good

Mr. Chairman, I am Frederick Williford, director of government affairs for the National Federation of Independent Business Accompanying me today is John J. Motley of our legislative staff. I think the committee would be interested to note that John is, as some of the labor witnesses you had this morning were, a member of the board of directors of the American National Metric Council.

The National Federation of Independent Business is an organization that is the largest single member business organization in the United States. We represent over 361,000 independent businessmen, and we welcome this opportunity to testify on S. 100, the Metric Conversion Act of 1973.

Why must small business be considered when you discuss metrication and, more importantly, how vital should the support of small business be to the success or failure of the U.S. metric conversion program? These are valid questions whose answers may be found by simply examining the role of small business in the American economy.

Mr. Chairman, small business accounts for over 95 percent of all businesses in the United States.

By 1977, the small business segment will represent over 97 percent of our total business population.

Small business employs over 50 percent of the American work force.

And in 1971, it accounted for over 37 percent of our gross national product and for more than 50 percent of our gross business product.

Small business accounts for the major portion of the Nation's business receipts, including 72 percent of all the dollars generated in retailing, 82 percent of those derived from the service industry, and over 85 percent of the total from construction.

On the other hand, while this appears that small business is really big business in the aggregate, smallness does have its disadvantages. And chief among these is its inability to absorb error, and it is very susceptible to any unexpected or prolonged shifts in the economy.

Although there has been some uncoordinated and widespread movement toward increased metric usage within the small business community over the past few years, NFIB believes that the present attitude of the Nation's independents can best be described as apprehensive and cautious. In other words, we feel that most small businessmen are not eager to switch from their present system of weights and measures to metric. They simply do not see any pressing need for the proposed changeover.

We believe also that metric will have a widely diverse impact on the various segments of the small business community. And as a result, it is difficult for us to develop a comprehensive small business position. We have polled our members over a period of years. We do find a ably disposed toward it to a somewhat more favorable predisposition toward metric.

However, there is still a major portion of the small business sector that is oposed to transition or conversion to metric.

NFIB also participated in the 1970 study by the Metric Study Group which was an operation of the National Bureau of Standards. Our survey, without going into the details—but the details are presented in our testimony or statement—was quite clear that, contrary to what seems to be a rather widely held and popular belief, there has been no significant shift to metric in the small business community.

I think this is indicative. There are very sound reasons why small and independent business embraces this cautious and reluctant posture.

The first among these reasons is that trade statistics show only 4 percent of all American firms are involved in international trade and that less than one-half of one percent of these are small businesses. Therefore, domestically oriented small businesses have little to gain from metric conversion.

Second, the large disparity in resources available to big and small businesses for metric conversion threatens to alter the current competitive balance in favor of the larger firms. Many small firms are extremely vulnerable to this type of competition, and it could have an adverse effect upon their market position.

Third, the small businessman is not convinced that his customers understand or want metrication. He fears consumer resistance to the changeover and a corresponding drop in sales.

Clearly, the small businessman has sufficient cause to be apprehensive and cautious toward metric conversion. This attitude is really nothing more than an example of his good, sound, business sense.

Incidentally, Mr. Chairman, may I parenthetically interject at this point, the conversion to metric is essentially an economic question so far as these businessmen are concerned. When the time comes they see it is economically feasible and economically beneficial to transfer or to convert to the metric system, they will be most willing and eager to do so. These men run economic institutions and hence they make the decisions on economic criteria which is really, as you know, the basic premise upon which many decisions in this country are made.

In fact, the major decisions always consider the economic aspects of the impact of that decision. If, however, metric is mandated, we believe that it should be that, just that, a mandatory system rather than a voluntary conversion program.

I will not go into the reasons for this at the moment in light of your time constraints, but it is adequately explained in our testimony.

Mr. Chairman in addition, there are a number of specific changes in S. 100 that we would recommend. Chief among these, and I will not go into it in great detail, is to make sure that it is specified that small business be represented on any groups that are determining how we proceed on metric and that small business be specifically identified in the law as being a group to be consulted.

I am going to ask my colleague——

Senator STEVENS. I do not think that will be difficult. I think that is a good suggestion.

Mr. WILLIFORD. Thank you.

These, as I say, are outlined in my testimony. So you can pick them up as you go along.

I am going to ask my colleague, John Motley, who, as I mentioned, has had an extensive background in metric, and who has served as one of the members on the board of directors of the American National Metric Council, to comment briefly on some of the aspects of our testimony that I think would be of interest to you, Mr. Chairman.

Senator STEVENS. All right, Mr. Motley.

Mr. MOTLEY. Fine, Senator, thank you.

To be as brief as possible, there is one thing that I would like to stress that I think the committee is after. And that is the matter of assistance to small business.

Section 18 of the bill provides for small business compliance loan authority for SBA. Any bill which is reported that does not have this authority in it would, of necessity, be opposed by the federation. We believe very strongly that it is needed. And we believe that it will help small firms to convert.

I did not particularly care for some of the comments I heard earlier this morning that some small firms, the ones that cannot bear it, are just going to have to go under. The federation does not accept that position. We believe that no firm should be forced out of business by metrication. We believe that no jobs should be destroyed by metrication.

We believe that if metrication does become a fact and that if it is needed by the country, then the Government should do all in its power to insure a minimum amount of job destruction and a minimum amount of injury to small business.

Senator STEVENS. I have to excuse myself and apologize to you. We are trying to run three shows at one time, and I have been called into the full committee meeting. I do appreciate your appearance.

And I will not be able to return because of the 11 o'clock schedule for a bill I have on the floor.

Thank you.

Mr. WILLIFORD. Thank you and on behalf of all our 361,000 members, we thank you for this opportunity.

Senator STEVENS. Thank you very much.

[The statement follows:]

STATEMENT OF FREDERICK L. WILLIFORD, DIRECTOR OF GOVERNMENT AFFAIRS, NATIONAL FEDERATION OF INDEPENDENT BUSINESS

Mr. Chairman, distinguished Members of the Committee, I am Frederick L. Williford, Director of Government Affairs for the National Federation of Independent Business. Accompanying me today is John J. Motley of our legislative staff.

The National Federation of Independent Business, on behalf of its member firms and the entire small business community, wishes to thank you for this opportunity to testify on S. 100, the Metric Conversion Act of 1973. With your permission Mr. Chairman I will submit our prepared statement for the Record and summarize our views for the Committee.

The National Federation of Independent Business was founded in 1943 to represent the interests of small and independent business. Its purpose and its program can be stated briefly:

To promote and protect our system of private business, with equal rights for all; and

To give small business a greater voice in laws governing business and our nation.

The Federation does not seek special privileges or attention to accomplish these goals; it simply asks that the problems and needs of independent business be given fair and equitable consideration along with those of the other segments of American society.

During its first thirty years, the Federation has grown into the largest single member business organization in the United States. As of November 1st, it had over 361,000 member firms and growth rate of approximately 2,500 members per month, making it the fastest growing national business organization.

Collectively, NFIB's member firms pack a very potent economic wallop. They employ well over 2.7 million American workers and have annual gross sales of almost $52.4 billion. And, in the seventeen states represented by the Members of this Committee, the Federation's 119,000 members employ over three quarters of a million people.

Our member firms range across the entire spectrum of the nation's economy from heavy manufacturing to retailing, and, according to the Small Business Administration's statistics, represent a true and accurate cross section of the American small business community. The majority of them are proprietorships and partnerships. More than 85 percent of these businesses employ less then twenty people and over 55 percent have gross sales under $200,000 per year.

The Federation's uniqueness is further emphasized by its practice of basing its legislative positions solely on a majority vote of its membership. Approximately every eight weeks NFIB polls its member firms on a number of important legislative issues. The results of this Mandate poll determine its stance on those issues.

The Federation's diverse composition, unique membership practices and rapid growth all attest to the fact that it accurately portrays the beliefs and attitudes of the vast majority of America's small, independent business community. For this reason, its views on metric conversion should be important to the deliberations of this Committee.

Why must small business be considered when you discuss metrication, and, more importantly, how vital would the support of small business be to the success or failure of a U.S. Metric Conversion program? These are valid questions whose answers may be found by simply examining the role of small business in the American economy.

Day after day, week after week and year after year we can search the business and financial pages of the nation's leading newspapers in vain for news on the current state of small business. Dow Jones averages, the latest economic indicators, a consumer story or two and columns and columns of print on GM, U.S. Steel, Sears, IBM and other members of Fortune's elite are always apparent, while news about small business is either relegated to a line or two about a local firm or completely omitted. Yet, out of the 5,480,000 full-time businesses operating in the United States, 5,200,000 of them are classified as small. Just think about that for a moment—more than 95 percent of all the business establishments in the U.S. are small businesses. And economists predict that by 1977 the small business sector will represent over 97 percent of our total business population.

By conservative estimates these small firms employ close to 50 percent of the American work force, a figure that increases significantly when only private, non-agricultural employment is considered. In 1971, they accounted for over 37 percent of our Gross National Product and for more than 50 percent of our Gross Business Product. The former figure represents approximately $385 billion in goods and services—a rather significant portion of our national economy.

The small business community also takes in the major portion of the nation's business receipts. While it captures only 30 percent of the total dollar volume in manufacturing, it receives close to 70 percent of the dollars in the wholesale trades; 72 percent of those generated in retailing; 82 percent of the total from the service industry; and over 85 percent from construction.

Indeed, it is almost impossible to think of a major U.S. corporation that does not rely heavily upon small business for subcontracting, marketing and supplies. Over 16,500 small firms have had a hand in the creaion and production of Boeing's highly successful 747 jumbo jet, while GM's annual records for new car sales would be impossible without the drive and competitive expertise of the independent dealers that market its product. Small firms also perform valuable

services in the areas of innovation and research. They develop new products and are one of the major sources for the discovery of new industrial processes and techniques. In either words, there is something very *American* about small business.

While there is a great deal of personal satisfaction in and professional pride derived from owning and operating a small, independent business, smallness does have its disadvantages. One of these is its inability to absorb error, which makes the small firm extremely sensitive to national trends and very susceptible to any unexpected or prolonged shifts in the economy. It also usually lacks the resources needed to employ the expertise necessary for it to cope with federally dictated changes in its production, operating or marketing procedures.

These disadvantages, along with a myriad of lesser problems, make starting and operating a small business very risky. In fact, we know that only three out of every ten new businesses survive past their first five years in operation. It is in the light of this disturbing evidence that we must examine the impact of metric conversion upon the American small business community.

Although there has been some uncoordinated and widespread movement toward increased metric usage within the small business community over the past few years, NFIB believes that the present attitude of the nation's independents can best be described as apprehensive and cautious. In other words, we feel that most small businessmen are not anxious to switch from their present system of weights and measures to metric. They simply do not see any pressing need for the proposed change over.

Metric conversion will have a widely diverse impact upon the various segments of the small business community. It will have little or no affect upon some firms, like those in the pharmaceutical and chemical industries, because they have already converted to metric, but it will have a greater and more trying impact upon others, especially those dealing in consumer oriented products such as packaged goods and clothing. In general, though, systems of measurement play a much more critical role in manufacturing and electronics. Standards, dies, machinery and technical diagrams must all be accurately changed or converted within a specified period of time—a monumental task for a small firm. One slip, one time consuming mistake could irreparably damage its competitive position.

Small firms with measurement sensitive operations are faced with a similar problem. Because of their highly competitive nature, they must be thoroughly prepared to convert whenever their materials and designs are changed to metric. Reluctance or hesitation on their part could cause them to lose valuable contracts. Engineering and architectural firms, and all types of building contractors would be included in this category.

Consumer orientated service and retail firms face a somewhat different situation. Their main problem is one of education. Auto mechanics, TV repairmen and a host of others will have to learn to use new tools and terminology to work on and with metrically designed products, while wholesalers and retailers will have to undertake comprehensive educational programs to overcome consumer reluctance and combat employee ignorance. Such programs could prove very costly and even financially impractical for many small firms.

The diverse nature of the small business community makes it extremely difficult to determine and present a cohesive position on an issue as complex as metrication. Because of this, the Federation has spent a good deal of time and money over the last seven years trying to gauge its reaction to the proposed change over.

During this period NFIB polled its membership twice on metric conversion. It also participated, at the invitation of the Department of Commerce, in the Metric Feasibility Study conducted by the National Bureau of Standards. If nothing else, these surveys showed that the small business community is deeply divided and not overly anxious to change its traditional system of weights and measures.

The Federation's first Mandate poll on this issue was conducted in 1965. It showed 41 percent of the responding members in favor and 54 percent against metric conversion. The remaining 5 percent were undecided. Metrication was polled again during February and March of this year. The results denote a shift in opinion to 51 percent in favor and 46 percent opposed.

While these polls indicate a trend in favor of metric conversion, the Federation does not feel that a 10 percent shift over a seven year period is dramatic enough to warrant its unequivocal endorsement of the change over. To the contrary,

we feel that this shift is so slight, and the percentage opposed so large, that it reflects a deeply split small business community and re-emphasizes the need for continued caution.

The air of apprehension or reluctance that we have noted here is reinforced by closely examining the findings of the 1970 survey NFIB conducted for the Metric Study Group (National Bureau of Standards). It surprisingly showed that only 6 percent of the respondents were then using metric, with the largest group of users being professionals. It also indicated that there had not been and probably would not be any rapid movement to metric by the small business community. Just 5 percent of the responding firms noted recent changes in the measuring systems used in their industries, while only 3 percent answered that they intended to switch to metric in the future. Clearly, contrary to what seems to be a rather widely held and popular belief, there has been no significant shift to metric by the business community. Nor does it appear that we can expect any widespread voluntary conversion in the near future.

There are several very sound reasons why small, independent business embraces this cautious and reluctant posture. And, most of them are based on the cost-benefit ratio of conversion.

The strongest and soundest argument used by the proponents of metrication deals with the current position of the United States in international trade. The world is going metric and the U.S. must protect itself by adopting the same course. If it does not, its ability to influence international standards and to increase, or even maintain, its present share of the world market will be greatly impaired. While this argument is valid, it is advanced on behalf of and would benefit only a very small portion of the American business community. This select group consists mainly of our major exporting firms, many of whom are large multinational corporations.

The export trade of the United States is dominated by big business—by conglomerates that have the market knowledge and the resources needed to compete on the same level with foreign cartels and government supported industries. Trade statistics show that only 4 percent of the nation's 5.4 million firms are engaged in exporting and according to the evidence gathered by the House Select Business Committee less than 12,000 small manufacturers out of the more than 300,000 with export potential are involved in sending goods abroad. Although over 90 percent of all U.S. manufacturers are small, they account for less than 10 percent of the country's exports, a fact that clearly shows the dominance of our large firms in international trade.

Small business has and probably will continue to concentrate its efforts on our domestic market. Because of this, it would gain little from metric conversion, the cost of which would far outweigh any benefits it might receive.

The vast gulf that exists in the resources available to big and small business to finance the costs of conversion is another reason why independents have maintained a wait and see attitude toward metrication. Most small firms are well aware that they will need help to complete a successful change over, while this is not generally true of their larger competitors.

Large corporations have the ability to convert to metric without encountering significant economic dislocation. Small firms, on the other hand, simply do not have the dollars needed to obtain the technical, financial and administrative expertise necessary to make an unassisted and successful change over. Most multinationals and many of our larger domestic corporations have already given considerable thought to metrication, and they are preparing to face the challenges and opportunities it presents. Unfortunately, the nature of small business does not allow it this type of luxury.

Unassisted, forced conversion to the metric system could prove the difference between success and failure for many small firms that do not have the capital or the expertise to make the transition. If big business is allowed to dictate the timing and terms of the change over, many small firms could be placed in an extremely vulnerable position *vis-a-vis* their larger competitors. This would be especially true of small manufacturers, who sometimes must employ used machinery in their operations. They simply could not make the transition to metric as inexpensively, as quickly and as easily as a General Motors or an IBM.

The American consumer is a whimsical individual and the small businessman must be ever conscious of his likes and dislikes. Since most small firms are controlled by market forces, constantly changing consumer tastes and attitudes are factors that cannot be taken lightly or ignored. Any faltering in demand or lag in sales might have a potentially harmful impact upon a small company.

The small businessman is simply not convinced that his customers approve of or understand the need for metrication, and his appraisal is backed by the findings of the Metric Study Group. Its investigation found that only 40 percent of the individuals questioned knew anything about metric units and that only half of these were familar with the relationship between traditional units and their metric equivalents. The small businessman sees this lack of knowledge about the metric system as an indication of possible consumer resistance to conversion. He feels that many people will be reluctant to study a new system that will challenge the security of their present life styles or alter familiar habits. And, he seriously doubts that they will be willing to spend the time and effort needed to learn a system imposed by legislative fiat for the benefit of large multinational corporations. In short, his apprehension and caution about metric conversion is nothing more than good, sound business sense.

A common thread—cost—runs through everything I have said so far about the attitude of small business toward metrication. The exact dollar figure and the amount of economic dislocation involved in conversion are very controversial topics and have been the subject of a long and heated debate, but no matter whose estimate is used the fact remains that there will be substantial costs resulting from any change over to metric, and it is time for us to take a brief look at where these costs will impact within the small business community.

In a recent article in the *Texas Business Review*, Mr. J. Bryant Adair, a staff member of the Bureau of Business Research at the University of Texas, estimates that metric conversion will cost Texas business $449 million. He breaks down and distributes this figure into nineteen separate SIC code categories, in which soft manufacturing ranks first at $101 million, wholesale fifth at $30 million and retail sixth at $22 million. Nearly three quarters of all our small businesses are concentrated within these three categories, which means that conversion would place a very heavy burden on our smallest firms.

The Federation's 1970 survey for the Metric Study Group determined that the average estimated cost per responding firm would be approximately $11,700. The distribution of these costs varied from $1,000 in the 0–3 employee size category to over $26,000 in the 50 or more employee group, and from a low of $600 in the financial and real estate industries to a high of almost $42,000 in manufacturing. The most surprising figure was an estimated average cost of over $17,000 by responding professional firms.

These costs must be viewed in the context of the present operating environment of small business. In recent years, a myriad of costly Congressional enactments, including consumer, job safety and environmental laws have had a negative impact upon certain segments of the small business community. Restrictive credit policies, an ever increasing federal paperwork burden and the pressures and uncertainties of Phase IV have only posed additional restraints. The cost of metric conversion, added to these, would strain the financial resources of many small businesses to the breaking point, and NFIB sees no immediate justification for exerting this unneeded pressure.

Before concluding my remarks, I would like to touch briefly upon what small business feels is needed in order to make any future attempt at metric conversion a success. But, first, it might be best to outline exactly that which would be unacceptable in its eyes.

Small Business opposes a completely voluntary conversion plan that would *let the costs fall where they may*. Unassisted, voluntary conversion would place the reins of decision firmly in the hands of big business, a situation that could pose a very real threat to many small firms that are vulnerable to this type of competition. The financial resources and expertise available to big business give it an edge in conversion—an advantage that would be used by some corporations against their smaller competitors.

In its 1970 Metric Study Group, NFIB asked its Advisory Council members to select the metric conversion plan they thought would be best if Congress decided the change over should be made. They were given a choice between a voluntary plan and a nationally coordinated program, and 67 percent of those responding preferred the latter. Their comments indicated that they heavily favored a nationally coordinated program because it emphasized education—an absolute necessity in their eyes.

The type of national program envisioned would also include Federal financial assistance for small firms threatened or faced with economic injury during the conversion period. It would consist of long term, low interest SBA loans, an approach which has won widespread Congressional approval in recent years. In

fact, this approach to metrication was recommended by the House Select Committee on Small Business.

In its report, *Small Business Problems in Metric Conversion* (House Report No. 92–913), the Select Committee specifically recommended "that the appropriate legislative committees of the Congress consider legislation which would amend the Small Business Act to provide financial assistance to small business concerns in converting to the metric system."

There is ample Congressional precedent for this type of loan program. Starting in 1969, with the Federal Coal Mine Health and Safety Act, Congress authorized SBA to make this type of loan. Since then, this same authority has been attached to the Occupational Safety and Health Act, the Water Pollution Act, the Egg Products Inspection Act and the Wholesome Meat and Poultry Acts, and just recently both the House and the Senate passed legislation giving the Small Business Administration blanket authority to determine when and where these compliance loans would be needed.

Section 18 of S. 100 incorporates the Select Committee's recommendation by authorizing SBA to assist small firms with metric conversion. The Federation strongly urges the Committee to retain this provision in the legislation it reports, because we would oppose any metric conversion bill without it.

If metrication becomes inevitable, small business would strongly prefer a well defined, coordinated conversion program, stretching over a number of years and emphasizing intensive education preparation. It would also favor Federal financial assistance for small firms that need it. But, small business is by no means convinced that conversion to the metric system is necessary, and if it had a choice it would, at least for the time being, leave well-enough alone.

Recommended changes in S. 100

Mr. Chairman, instead of just simply stating our position on the Metric Conversion Act to the Committee, the Federation would like to suggest several specific changes in S. 100. In accord with the position established and documented by the House Select Small Business Committee, these recommendations are intended to insure "that due consideration is given to the problems of small business in planning and effectuating changes to metrication."

First, NFIB urges the Committee to amend Section 6(a) to specifically include small business in the composition of the National Metric Conversion Board. This can be accomplished by inserting the wording "including but not limited to small business," after the word "business" on page eight, line 23.

Our rationale for this recommendation should be obvious. It is explained in detail in our previous comments and derived from a widely held interpretation of the intent of Congress. Big business and small business are, for all intents and purposes, separate entities. They have different problems and needs. The Chairman of the Board of General Motors can no more speak for the corner druggist and local contractor then they can speak for GM. But both small and big business will be affected by metric conversion, and both should be represented on the National Metric Conversion Board.

Our second recommendation is based on the same rationale. Section 17(b), dealing with tax assistance, should be changed by adding the Administrator of the Small Business Administration to the list of officials that the Secretary of the Treasury is specifically instructed to consult on recommendations for additional changes in the tax code. This can be accomplished by placing a comma after the word "commerce" on page 17, line 10 and adding the following new wording: "the Secretary of Labor and the Administrator of the Small Business Administration."

Third, the Federation strongly recommends several important changes in Section 18. This Section is the heart of the bill's small business assistance program and it will be critical to the impact metric conversion has on the small business community.

NFIB disagrees with the thrust of this Section as conveyed by its title—Conversion Assistance to Business and Individuals. Such blanket SBA assistance to all businesses and to individuals is inconsistent with the original purpose of the Small Business Act. SBA aid is limited by statute to small business and to small business only, and the Agency has neither the staff nor the expertise to expand its activities into the new areas suggested by Section 18.

This misdirected thrust can be corrected by using more precise terminology and by dropping paragraph (b)(1), which would authorize SBA grants to individuals to defray the cost of replacing tools made obsolete by metric conversion. NFIB feels very strongly that the latter function should be left to the Department

of Labor, not the Small Business Administration. And we feel that organized labor would agree with us on this point.

Clarity of purpose can be attained by making a few minor changes in the language employed in the Section. First, the title should be amended to read simply "Conversion Assistance to Small Business." Second, the word "small" should be inserted between the words "any" and "business" on page 17, line 22. And third, the phrase "in consultation with the Secretary of Commerce," on page 17, lines 20 and 21, should be deleted and be replaced with the words "may determine."

The Small Business Administration is not required to consult with the heads of any other departments in determining the need for compliance loans, and the Federation sees absolutely no need for this precedent to begin with the Secretary of Commerce.

Finally, there are two additional changes that we would like to recommend in Section 18. First, in the description of the conditions for SBA assistance, on lines 23 and 24 of page 17, delete the word "or" and insert between the words "operation" and "to" a comma and the following new language: "or to retrain or educate its employees."

The original language is too narrow and limits assistance to those firms forced to make physical changes. It omits as a condition for assistance the type of problem anticipated by service, retail and wholesale firms. The Federation feels that this is discriminatory and should be corrected.

Second, we urge you to delete the word "substantial" on page 18, line two. NFIB sees no need for a small firm to suffer "substantial economic injury" before it is eligible for an SBA compliance loan. This is not a grant. Not a subsidy. It is a loan—a loan that will be repaid with interest.

If an SBA loan helps a struggling small firm overcome the difficulties arising out of conversion, everyone, including the Government, will benefit. On the other hand, if the firm is left to fend for itself, job destruction, a faltering local economy and the loss of tax revenue could result. (A copy of the language suggested by NFIB for Section 18 is attached.)

The National Federation of Independent Business considers it a privilege to have had the opportunity to testify before this distinguished Committee. We hope our comments will be helpful to you in your deliberations and we stand ready to be of assistance to you at any time in our mutual efforts in behalf of small business.

Mr. Chairman, should the Members of the Committee have any questions on my testimony, I shall be happy to try to answer them.

Thank you.

CONVERSION ASSISTANCE TO SMALL BUSINESS

Section 18(a) Section 7(b) of the Small Business Act is amended by adding after paragraph (7) a new paragraph as follows:

"(8) to make such loans (either directly or in cooperation with banks or other lending institutions through agreements to participate on an immediate or deferred basis) as the Administration may determine to be necessary or appropriate to assist any small business concern to make changes in its equipment, facilities, methods of operations or to retrain or educate its employees to conform to the national plan of metric conversion submitted under the Metric Conversion Act of 1973, if the Administration determines that such concern is likely to suffer economic injury without assistance under this paragraph."

(2) There are authorized to be appropriated to the Small Business Administration such sums as may be necessary to carry out this subsection.

[Whereupon, at 10:45 a.m., the hearing was adjourned.]

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

AMERICAN FARM BUREAU FEDERATION,
Washington, D.C., November 1, 1973.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: In response to the Committee's October 17 announcement of hearings on Friday, November 2, we are communicating views of the American Farm Bureau Federation on S. 100, the Metric Conversion Act.

Farm Bureau is the nation's largest general farm organization, with a membership of more than 2,175,000 families who are voluntary, dues-paying members of 2,831 County Farm Bureaus located in 49 states and Puerto Rico. Policies of the American Farm Bureau are developed through study and discussion at community, county, and state levels. Policy recommendations of individual State Farm Bureaus are considered at national meetings of Farm Bureau, with final determination of policy made by elected voting delegates from the State Farm Bureaus to the annual meetings.

At our most recent annual meeting, held at Los Angeles last December, elected voting delegates adopted a policy with respect to conversion to the metric system, as follows:

"We support the gradual adoption of the metric system in the United States."

The announcement of this hearing stated that particular attention would be given to the issue of federal financial assistance to private individuals to cover costs incidental to the conversion. We do not feel the government should attempt to compensate anyone for any costs which may be incurred in the transition to the metric system. Such costs are extremely difficult to calculate, particularly when the transition is made on a gradual basis.

We respectfully request that this communication be made a part of the record of this hearing.

Sincerely yours,

CLIFFORD G. MCINTIRE,
Legislative Director.

ROBERT C. SELLERS & ASSOCIATES, INC.,
Floral Park, N.Y., November 12, 1973.

HON. WARREN G. MAGNUSON,
Chairman, Senate Commerce Committee,
Washington, D.C.

DEAR SENATOR: As you are aware during the hearings on S. 100 held on November 2nd, one of the labor representatives, Mr. Thomas Hannigan of the IBEW quoted from a book I have authored entitled, "The Executive Guide to Planning Transition to the Metric–SI System".

During the discussion Senator Stevens suggested to the Committee Staff that they get a copy of this book and review it. In this respect I have already sent a copy to the Committee Staff for its use.

I would like to clarify some of the remarks quoted from my book in light of Mr. Hannigan's use of them and am forwarding sufficient copies of this letter for each member of the committee simultaneously with this original to you.

1. Mr. Hannigan referred to me as a friend of his and this is most certainly correct.

2. He also referred to me as being 'pro-metric'. This is also correct, however may be subject to misinterpretation. If being 'pro-metric means going metric come hell or highwater he is wrong. In years past the 'pro-metricists' were the educators (a select few) and scientists who were gung-ho on adopting a more workable system of measurement.

As a management consultant who has specialized in long-range planning studies for industry (many of the top 100) I have no interest in metric (or any other subject) unless it can be proven to me that it has a clear *economic advantage to benefit the business climate.*

"Going metric" for the sake of metric itself is in my opinion pure nonsense. "Going metric" for clear economic advantage is sound thinking. And, based upon four years of intensive study of transition efforts in other countries plus the world-wide trend toward adoption of a truly common international system we can come to no other conclusion.

We are affiliated with the largest metric consulting group in the U.K. (who have more experience in conversion projects than anyone else in the world) we have case history experience in many, many industry sectors which bears out our conclusions—independently arrived at!

Mr. Hannigan quoted me in several areas in which the theme stressed was that transition for this country would be complex, costly, and traumatic. I cannot disagree with the validity of this emphasis inasmuch as I have seen enough elsewhere to bear this out. In talks before management groups across the country I have suggested that the planning required is tantamount to that of no other single planning effort we have ever undertaken bar only that of the production planning program in World War II. Now the fact that something is complex, costly and will cause trauma is no reason to stop moving forward. What don't we have in our society today of high value that did not start out with the same forecast?

From the viewpoint of the business community one must assess costs in relation to benefits. Does transition to the metric-SI system and its costs result in the long run in benefits that outweigh the costs? The answer in our experience is that it will.

For example, there have been predictions that it will cost the nation from as low as $10 billion to as high as $100 billion. The truth of the matter is that until each sector comes up with its own program no one really knows. The figure of $100 billion was developed at a time when people thought that we would have to replace every machine tool in the nation if we went metric (the machine tool inventory is estimated to be $35 billion). Ten years ago even the U.S. machine tool manufacturers promoted that ghost—now facts show that not a *single machine tool,* irrespective of type or manufacturer, *cannot be used to produce parts to either the inch or metric system!*

We can marshal many, many statistics on all aspects of the transition effort to show costs. However, our accumulated experience suggests that costs are all short-term ones and that the long-term benefits far outweigh them in gains.

If we take any single industry sector as an example working through their trade groups they will come up with a transition program applicable to them. To do this they will require each firm to do its own internal study based upon their assessment of the cost and its benefits to them. This is why in current legislation I feel that a one year planning period is inadequate. Most trade groups don't know the task they face in metric transition and will lose readily 3 months just getting organized. I might point out that Canada did an excellent job but did take a full 2 years. They, like ourselves, had the advantage of the work accomplished by other countries who preceded them in the move. Considering the size of our own industrial complex a one-year planning period (while possibly attainable) will be a high pressure situation at least.

One has only to look at some of the questions each company will have to answer, in its own way and in its own time, to appreciate how complex they are and how much answers to many of them depend on proper national coordination.

Because of the wide range of circumstances individual companies inevitably find themselves in, the decision whether or when to go metric is essentially one for the company itself. A number of factors will affect the timing of such a decision: the attitude toward metrication of other firms in the same sector; the requirements of major customers domestically; the pattern of foreign trade; the availability of suitable metric materials and purchased parts; the existence or absence of suitable standards—all these, with other cost factors, both short and long-term, must be weighed in the balance.

The decision to go metric is only a beginning. A whole range of interlocking problems is immediately opened up. No aspect of the business is unaffected. I do not suppose most people in industry would regard it as an argument in favor of metrication, but the very fact that a company's operations will need to be overhauled from stem to stern can itself yield substantial dividends.

Because the decision to go metric is essentially a marketing one it must involve an intensive review of the firm's market position, the life cycle of its present production range, the length and pattern of its current orders, and an assessment of the new marketing situation that will be created at home and overseas by the shift to metric: all this against a background of what the industry as a whole may be doing to concert its activities in the metric area in collaboration with its appropriate trade groups and/or standards groups.

Training necessarily comes into play early in the game. First of planners, designers and supervision, then of factory personnel themselves. A major step toward insuring a successful transition will be to achieve proper understanding and acceptance of it among the work force as a whole.

Design and development is an area that offers substantial savings in the long run. This is not only because metric units are very much easier to work with—one estimate suggests there may be ultimately as much as a 10 per cent saving in design time possible, but also because of the potential economies from variety reduction and alignment to international standards.

During the transition designs are unlikely to be introduced any faster than the normal rate for new designs. It will sometimes help to keep costs down by using dual dimensions: that is, to add suitably rounded conversions in metric units to drawings, specifications and technical literature. This permits a firm to start working and quoting in metric units without changing the actual sizes or designs of the product and without converting or replacing the tools and machinery that go to make the product.

Costs can also be reduced if metric working is introduced gradually and advantage is taken of opportunities to mix metric with the customary dimensions of the design. Often the most expensive tooling produces internal components of little interest to the customer, and there is no reason why these parts should not continue to be produced on the old tools in the old units while the external and interface dimensions of the product are made in metric sizes to the new U.S. industry standards or internationally-agreed modules. Some engineering firms with close connections with affiliates overseas have been working in this fashion for years with no particular problems.

Simultaneously with all this there will need to be a similar and parallel reorganization of purchasing policies and procedures, coupled with an assessment of the likely availability of basic materials and purchased components to metric sizes.

No less important is a corresponding review of production capacity, with the conversion, where necessary, of existing plant and machinery and the replanning of replacement schedules.

These are just a few of the problems that the individual company will face. There are many others I could have touched upon: after-sales service, for example, and the thorny problem of dual-inventories of metric and customary sizes; inspection and quality control; contract specifications, etc.

Is it all going to be worth it? Yes, a substantial body of industry in this country thinks it is. Irrespective of export markets the key area is the opportunity metrication offers for a comprehensive re-shaping of our technical standards, and thus permits the rationalization of the size and quality ranges of our products, eliminating the superfluous varieties and unwanted types. This process of rationalization lengthens production runs, cuts down the amount of work in process, brings down the size of inventories, simplifies the system, and reduces unit costs all along the line. Here again, it is dangerous to generalize, for circumstances vary, but in most cases overseas experience shows that they will rapidly repay the firm for the costs of the changeover.

Far too much capital is tied up in inventories unnecessarily, and metrication should insure that they are extensively pruned, by the end of the changeover period, even if there has to be some duplication during the actual transition.

The theme of my book is that in the long-run benefits far outweigh the costs. But the book also indicates that let us be under no delusion as to the effort required to introduce the new system. Above all we must keep the costs down to a minimum.

This is the nub of the matter. Some additional costs are probably unavoidable: the cost of converting tools and machinery and of any necessary replacements on capital needs; the cost of retraining some categories of staff and plant work forces; the costs of dual inventories and of temporary disturbances in the production line over the transition period; the costs of change in documentation and procedures—even perhaps the costs of mistakes.

I have presented this summary of costs vs benefits purely to back up the theme that the transition needs detailed *planning—both* by *government* and the *industry sectors themselves.*

The Congress has the results of the NBS Metric Study indicating that 85%+ of industry support the move. S. 100 is on the right track and should be supported, and no doubt will compromise with H.R. 10576 on some elements.

Mr. Hannigan's final quote from my book with respect to—

"In regard to the voluntary aspect of it, he has a quote in here: 'Although legislation speaks of voluntary change, events elsewhere suggest that the ultimate net effect will be no less than a mandated change.' "

This is not a fault in and of itself—in any industrialized nation there are certain key industry sectors, for example, in the United States the automotive industry is one such key sector. Realistically with General Motors announcing that henceforth all designs will be metric from the start they set the pace and 40,000 suppliers will either go metric or look for a new customer. As each and every country in the world has gone metric the key industry prime firms set a similar pace. Thus, I suggest that in the ultimate the word 'voluntary' is open to question—no more no less.

One must relate the role of the big business firm to the roles they play in being the prime sources of new technology and research effort—Ford went from horse buggies to automobiles and at the time Henry Ford was considered both a genius and a plague. Yet, look at where we are today with an industry of such proportions that the national economy either thrives upon or flounders.

GMC's announcement should not send traumas throughout its supplier system for they acted most responsibly and sent all a letter indicating the following:

"Our present planning is dedicated to making this changeover as soon as new parts can be metrically dimensioned and sources are able to produce them.

Since the rate of changeover will vary with particular divisions, it is important for you to maintain your traditional relationship with the divisions you supply.

We are currently developing coordinated standards in the areas of Engineering, Drafting and Testing. These standards will be made available to you on request. We are also investigating machine tool conversion and have established a Metric Educational Program.

We encourage you to discuss the Metric Conversion Program with the General Motors division you supply.

This is a pattern that will undoubtedly be followed by other industry sector key firms.

Remember, all this is taking place *without any implementing legislation* on the books! It is a pace that is underway across the nation as well as throughout the world. In one sense, Congress is a little late to act—for with or without S. 100 or H.R. 10576 the nation is well underway to metric-SI.

The hearings of November 2nd heard comments from both the unions and the National Federation of Independent Businessmen in which one might come to the conclusion that they ask for a delay in the overall program. Because of moves as I outlined earlier they know full well the move is inevitable.

I can concur with them in repeating a theme that runs throughout my book—the planning required is needed now and will take more than the year suggested in the legislation. I hope the Congress will lengthen the planning period but should they not do so the legislation is urgently needed to spell out clearly to the doubters that like it or not we are well down the road to metric today. All too many managers across the nation are assine in assuming that if legislation does not pass the move to metric will stop and the problem will go away.

I can give the Committee a comment based upon our knowledge of companies in Europe *who made the transition*—not one of them faced total costs which exceeded those on any wage/fringe increase awarded under any major union contract in the U.S. in the past three years. If industry can live with that—why such trepidation concerning the move to metric?

If Congress wants to *protect the interests* of our total society in a metric era the most effective move it can make is to pass implementing legislation so that we have a *coordinated national planned program* rather than our present shift on the basis of the present gradual approach dictated perhaps by key firms in major control positions!

If there is concern that there will be transitional injuries resulting from passage of implementing legislation. And, I for one feel that a society which accepts the idea that the welfare of individuals is a legitimate concern of government cannot, consistently with this acceptance, ignore any transitional

injury that results from government action. But again, based upon experience in other countries, such injury is minimal. The House Bill adds a role for the Metrict Conversion Board which states in Sec. 9.(a) language on page 8, line 3 and 4 as follows: "Such plan may include recommendations for legislation deemed necessary and appropriate." Does this not suggest that *until a plan is developed* (and properly so) *no one can identify for certain* in advance areas of potential need for transitional assistance legislation?

If this interpretation of the objectives of the Board is correct does this not protect the interests of all sectors of our society?

The root of the matter now boils down to the fact that the nation is currently going metric—like it or not—passage of implementing legislation is needed now to keep the program moving on a nationally controlled basis. Without this the fears expressed by small business and the unions will be most valid.

Respectfully yours,

ROBERT C. SELLERS, *President.*

UNIVERSITY OF WISCONSIN CENTER,
Waukesha, Wis., November 20, 1973.

Hon. DANIEL INOUYE,
Chairman, Senate Commerce Committee,
U.S. Senate,
Washington, D.C.

DEAR SENATOR INOUYE: I was quite disturbed, when I read the statements made before your committee on November 2, 1973 by Mr. Frederick L. Williford of the NFIB and Mr. Kenneth Peterson of the AFL/CIO. I have serious doubts, if these gentlemen really represent the opinions of the majority of the membership of the organizations they claim to represent. Of course, being lobbyists, they try to get the maximum financial support for their membership. That is part of their job! But in my opinion their statements are filled with inaccuracies. Reading them isn't even funny!

Let us first look at Mr. Peterson's statement. He talks a great deal about education and retraining. I think Mr. Peterson insults the intelligence of the American workers when he suggests, that educating and retraining to adapt to the use of the metric system is such a tremendous almost impossible task. I wonder if there are any facts on which Mr. Peterson bases his statement. Has he checked with workers in companies in this country, that have changed over to the metric system or are in the process of doing so? Has he checked what effect the change over to the metric system has had on workers in England? I recommend Mr. Peterson (and also Mr. Williford) to read what the Right Honorable The Lord Ritchie-Calder, first chairman of the United Kingdom Metrication Board, had to say about the experiences in England and his recommendations to us, so that we would not make some of the same mistakes they made.[1] Among others Lord Ritchie-Calder states: "A faster change over is better and more economic". I have had the pleasure not only to listen to Lord Ritchie-Calder's statement, but also to communicate with officials of American companies that have changed to the metric system or are in the process of doing so, such as Timken Bearing, Allis Chalmers, John Deer, General Motors, Caterpiller, IBM, just to mention a few.[1]

I have made presentations before service clubs, labor union members of engineering or engineering related societies, management groups, womens clubs, teacher groups and at university seminars. I have never run into any serious anti-metric argumentation and I wish I could have been present during the hearings of your committee to give answers to all the "may-be's" raised by Mr. Peterson and Mr. Williford! It has been a great pleasure for me to work with union members of the Allis-Chalmers company and prepare them for "working in metric". Apparently my methods were effective, according to a statement made by Mr. Stephan (copy enclosed)[2]. Of course there are many do's and don'ts in the training process such as: "Don't overdo it", "Divide your personnel in groups and teach each group only what they have to know" (many, many personnel members are hardly affected by the change to metric!), "Don't get a teacher who wants to show how much he knows and who might look down on the

---

Footnotes at end of article.

workers", etc. Pointers on "Training Your Work Force to Think Metric" can also be found in the published House Committee hearings.[3]

As a result of my experiences I can say, that I don't anticipate any problem with teaching the general public the use of the metric system. And this statement is backed by experiences in companies that made the change and by experiences in England, where even housewives soon preferred the metric system over thheir old "English" system.[1] I would like to see Mr. Peterson come up with honest figures showing the number of workers in American companies, who lost their job or suffered economic set-backs as a result of their companies adopting the metric systesm! And he might as well try to come up with similar figures from England, where the metrication process is nearing completion. At the same time he might check how much the English workers had to spend on "metric tools". He will find, that the figures he gives are greatly exaggerated and that the figures given by Mr. Harold O. Stephan,[4] who works for a company that went metric in some departments, are much more realistic. Of course Mr. Stephan does not include in his listing the tools that are not affected by going metric, such as hammers and saws, screwdrivers, am-meters and voltmeters, etc.

Mr. Peterson calls the 1971 National Bureau of Stadards report "inadequate, with biased and misleading conclusions". Quite a statement by someone who is paid to be biased and who I think did not properly do his homework. In my opinion there are indeed some inaccuracies in the NBS report, but I think these inaccuracies are more biased against the metric system than for it. Let me just comment on a few:

1. Many "For" and "Against" opinion polls were made. Included in the poll were people who had no or hardly any knowledge of the metric system and who did not have the opportunity to use it. Many of them might have thought (as I found out when I made my presentations), that the metric system was just as complicated as the English system, which took them so long to learn. So why learn another complicated system? Polling everybody on something unknown to them is like asking people who never ate tomatoes if they like potatoes, or asking a psychologist's opinion about a bulldozer.

2. Estimated conversion costs are on the high side. Again, when the report was made no reliable data was available. Now we have the experiences in England to go by. In England conversion costs came out much lower than anticipated.[1] It is indeed practically impossible to come up with an accurate cost estimate and, as stated by Lord Ritchie-Calder [1] it may not be worth while trying to come up with a figure. However, I can identify one area, where the percentage of the total change over cost in industry as shown in the NBS report is greatly exaggerated, and that is the percentage alloted to "Education and Training". The NBS report shows 11%, which is the result of a survey of guesses by people and organizations, most of whom had no or very little knowledge and experience in this area. As a result of my own experiences and from talking to officials of companies that went metric or are in the process of doing so I arrived at a figure of "from 1 to 1.5% of the total". And this figure is confirmed by experiences in England, where "Education to Metrics" proved far simpler than anyone had dared to dream. There might have been another factor, that contributed to the high figure in the NBS report. May be too many educators were asked to give their opinion. I have seen many proposals for 12 or more sessions of 2 hours each using kindergarten approaches (insulting to the intelligence of the American worker) and lots of unnecessary boring materials (including expensive textbooks.

We should not forget, that very few of the teachers who came up with such programs were ever involved with industrial training or adult education, where people come to class because they want to and not because they have to. And we should not forget either, that my colleagues who came up with proposals for metric educational materials were after grants for developing such materials. And believe me, it appears to be easier to get a $50,000 grant for an extensive proposal, stretched over a long period of time then getting $5,000 support to develop a simple effective training program. For your information I enclose an outline for a seminar for those who may be charged with "in plant" training programs. And this training program has proven to be effective.[2] It is inexpensive, because most companies have equipment to duplicate the handouts that are provided.

One more remark on the cost of education in our school system. The NBS report concludes, that by changing to the metric system we may be able to graduate

---

Footnotes at end of article.

students from high school one year earlier! Experiences in England indicate, that this is indeed the case.[1] It might be possible to put a dollar figure on the resulting savings.

Now I will turn to Mr. Williford's statement. My previous comments already cover a rebuttal of part of it. I think Mr. Williford should first removed the chip from his shoulder when he calls GM, US Steel, Sears, IBM, etc. the members of Fortune's elite. All these companies were once small. They were founded by men with lots of guts, brain, original ideas, energy and drive. These companies became big, because they just out performed others. And there are many small businessmen, who are doing the same thing today. As Mr. Williford states, small business is often indeed very innovative and very instrumental in the development of new products, industrial processes and techniques. Many large industries rely on them because of their expertise in certain fields. Top brains and "idea men" are often blocked from promotion in large corporations as a result of red tape, company policy or some kind of bureaucracy that developed. Many of them founded their own small business in which they certainly have no problem applying new discoveries to their field of expertise. Then why would they have problems adapting to the metric system? I would think they would be able to take advantage of the change to metrics much faster than a large corporation, where changes cannot take place because of the much greater number of factors involved. As far as guidelines for a smooth, systematic and most economic change is concerned, these are being developed by various organizations now, so that assistance will be available to all businesses when the time arrives.[5]

Mr. Williford mentions small businesses dealing in consumer oriented products such as packaged goods and clothing. Why did he not consult with small businessmen in this field in England instead of what sounds to me like a shotgun statement, that may not have any foundation! Then he jumps to manufacturing and electronics. Many of our TV sets, radios and other electronic gadgets are completely or partially made in Japan "in metric." What is metric in diagrams? Do servicemen have problems reading diagrams of electronic equipment made in Japan? Are small businessmen having problems producing dies and parts for large corporations? These corporations often set their own standards. If suppliers can interpret these they can certainly interpret metric standards! And let's face it, any new standard that is set will most probably be described in a language using metric units, which have simpler relationships between them and because "Metric" is the international language of measuring used by over 95 percent of the population of the earth. Indeed, the use of the metric system is not increasing very much internationally. There just is not much room for growth in a 95 percent metric world! Of course the knowledge of the English system of measuring has plenty of room to grow among the world population. I can imagine, that in some countries it might be taught by historians to scholars who might just wish to learn about it out of curiosity, just as I have studied the ancient and antiquated Mayan, vigesimal, Chinese rod and other numeral systems.

As far as the chance of making errors is concerned, experiences in England and in companies in this country indicate, that there is much less chance for making errors when working in the metric system than when working in the English system of measuring.[6]

Mr. Williford also mentions the resistance of engineering and architectural firms. I don't know what Mr. Williford's background is, but mine is engineering. On metric matters I am the official national representative for one of our nations major engineering societies and I am a member of a few others. Engineering societies are solidly backing conversion to the metric system.[7] I really wonder if Mr. Williford did his homework in this matter.

Mr. Williford also mentions auto mechanics. I consider good auto mechanics quite intelligent. They don't appear to have problems servicing imported "metric" cars, and most of them already seem to have the tools for working on such cars.

FOOTNOTES

[1] Statement by Lord Ritchie-Calder before the House Committee on Science and Astronautics, Subcommittee on Science, Research and Development, May 9, 1973—page 377 of the published hearings.

[2] Excerpt from statement by Mr. Harold O. Stephan on March 21, 1973, from pages 226 and 227 of the published House Committee hearings.

[3] House Committee hearings, pages 414–418.

[4] House Committee hearings, pages 230–233.

[5] See enclosure : A Management Approach to Company Wide Metrification.

[6] See for instance : "The High Cost of Not Converting to the Metric System", by E. S. Roth, Manufacturing Engineering and Management, April 1971.

[7] House Committee hearings, pages 234–243—statements on behalf of engineering societies by Dr. Donald E. Marlowe and Paul Robbins, P.E.

I think it will be more difficult for them to learn to service anti-pollution devices and the more economic rotary engine (for which additional tools will be required) than learning to work in metric. From his statement I would assume, that Mr. Williford is opposed to the introduction of anti-pollution devices on cars and to the introduction of the more economic fuel saving rotary engine.

He then continues to make remarks about the small business community being deeply divided and not overly anxious to change to the metric system. I would like to see the figures that back this statement, especially since he apparently included engineering and architectural firms and many service firms (TV repair and auto mechanics) in the "against change" category.

Mr. Williford also states, that only 12,000 small manufacturers are involved with export. Earlier he stated, that over 16,500 small firms have had a hand in the creation and production of Boeing's highly successful 747 jumbo jets. Is he not contradicting himself here? Aren't all these 16,500 small firms involved with export? Aren't Boeings foreign sales of commercial planes higher than its domestic sales for such planes? And I just wonder how many of the nuts and bolts sold to our machine tool builders and manufacturers of agricultural and road building machinery are exported? And how many of the tools and dies produced by small businessmen are used to produce parts for products that are exported?

The NBS study also gives opinions on the cost of replacing machine tools in order to enable a manufacturer to produce in metric. When the report was made not much was known about this subject. All that could be done then was make some guesses. Now we have data from England which show, that in most cases the same machinery used now can be used to produce in metric. Where necessary, machinery can readily be adapted for metric machining. Here and there some dials may have to be added and some gears changed. And small business in England was instrumental in finding many of the shortcuts for the changeover and took advantage of it. I doubt it very much that efforts for finding such ingenious solutions would have been made if there would have been large scale government subsidies available for the change over.

Mr. Williford then talks about average estimated cost per responding firm. Is this again "guestimates"? Did he check with his counterpart in England? Did he check what gains could be the result for small businessmen when changing to metric? Then comes another "may be" statement: "The threat of economic injury during the conversion period." Nothing serious happened in England or in any of the other countries now in the process of changing to the metric system. So why would it happen here?

As far as the composition of the metric conversion board is concerned I have these comments. I hope it will consist of knowledgeable people with high professional and ethical standing. Of course they should listen to special interest groups, but I believe that the functioning of the board would be seriously hampered if some of its members would also act as lobbyists for special interest groups.

I sympathize with both Mr. Peterson and Mr. Williford, who are both lobbyists trying to get the most out of any government proposal for the members of their organizations. That is part of their job. To me both of them appear to be born pessimists and maybe that is part of their job too. Anticipate problems everywhere. However, they should not insult the intelligence and ingenuity of the people they claim to represent. And I think they should do a better job on their homework by checking experiences in countries that are in the process of going metric and with American companies that went metric. They should never take what might be considered a "Shotgun Approach" in opposing the very serious matter of our country considering the metric system to become its predominant but not exclusive system of measure.

If you think there is any way I can be of service to you in this matter please get in touch.

Sincerely,

HENRY KROEZE, P.E., *Chairman.*

STATEMENT OF NATIONAL ASSOCIATION OF MANUFACTURERS

NAM is pleased to submit its views on the proposed metric conversion legislation. NAM's member companies—large, medium, and small in size, account for a substantial portion of the nation's production of manufactured goods—as well as the employment of approximately 15 million persons. As such, each and every one of our members has a vital concern with any planned metrication legislation.

INTRODUCTION

At the NAM Board meeting last February, NAM's Board of Directors unanimously endorsed the principle that it is in the long-term best interests of the United States to adopt the international metric system (SI). A copy of this complete policy statement has been provided to the Committee for inclusion in the record. The NAM has also presented written comments and a copy of its metric conversion policy statement to the House at its hearings on metric conversion earlier this year.

Manufacturers per se are in the group *most affected* by any metric conversion move and, as such, need to see in any ensuing legislation clear recognition of certain vital elements, if the transition program is to proceed on an orderly and economically sound basis. The NAM desires to compliment this Committee and its staff on Working Draft No. 1, S. 100, dated October 4, 1973, and the forethought that has gone into that document. The suggestions and recommendations we shall make relate to only a few provisions in the proposed legislation thus confirming the initial comment that NAM endorses the general philosophy of metric transition and merely questions the approaches utilized. Our assessment recognizes that, while the conversion to metrics will be costly to manufacturers, the long-term implications and benefits far outweigh the interim problems involved. Thus, NAM cannot only live with most of the terms in the proposed legislation but also strongly endorses the underlying principles involved.

Let us now turn to the specific items in which we feel clarification or changes should be considered:

METRIC—PRIMARY OR ONLY LEGAL SYSTEM?

We favor adoption of the international metric (SI) system using language wherein it becomes our "primary or predominant" but "not exclusive" language of measurement. Thus in this respect, we commend the language expressed in Working Draft No. 1, S. 100. There are numerous reasons—economic, technological, and social where *total exclusion* of other measurement systems is wholly unwarranted.

TIMETABLE FOR ADOPTION OF METRIC SYSTEM

In the proposed legislative draft, provision is made for a 10-year conversion program. We urgently recommend that the language be *modified* to specify that this is a target implementation period for planning purposes. It is our conviction, based upon close study and observation of the ongoing United Kingdom conversion program, that until the Metric Conversion Board, working with industry sectors, *finalizes its plan*, no one can establish on *firm ground any fixed date* or period of time for conversion of an industrial complex of such vast proportions as we have here in th United States. Another closely related element pertains to the timing of any initial starting date. Language specifying predominant conversion by "ten years from the date of the enactment of this Act" reduces the actual implementation time available by the amount of time allowed the Metric Conversion Board to do its planning work, and the speed with which the President and the Congress respond to the final plan submitted. If they take no action during the 60 days provided for automatic implementation of the legislation, the actual time available for implementation then becomes only eight and one-third years, after deducting the 18 months planning period and the 60 days approval period.

It is our suggestion that the statute should clearly provide that the 10-year implementation period (if that is what is developed by the Board) begin with the approval of the plan by the President and the Congress, or when the 60-day automatic start of implementation places the plan in action.

COMPOSITION OF THE METRIC CONVERSION BOARD

The present legislative proposal suggests that the National Metric Conversion Board be composed of 11 members. We call to the Committee's attention that the United Kingdom, whose manufacturing base is considerably smaller than that of the United States, has 14 members on its Board. We recommend that in any final legislation the Committee move for a 25-member Board as provided in H.R. 11035, as being more appropriate for our nation. We must presume that the Board will function with Steering Committees aligned with related industry sectors, with each Steering Committee being monitored or chaired by a member of the Board. A Board comprised of merely 11 members could not possibly manage such an effort without placing an unbearable burden on the individual Board members.

TIME FOR BOARD TO COME UP WITH FINAL PLAN

As indicated in earlier comments, two time periods have been suggested for the Board to arrive at a final plan—12 months in H.R. 11035 or 18 months in Working Draft No. 1, S. 100. It is our recommendation to the Committee that the Board should have the 18-month planning period for a number of reasons. The key reason concerns the variety and range of groups with which the Board will have to work. For example, in our country there are over 1,700 *national* associations and trade groups, all of which will have to participate in plan development. Most have limited staffs and very few, at the moment, have any idea of what they will be required to do once we move on metric planning.

The NAM is planning a program to alert the trade associations to what is coming. We must do this in the interest of industry and the nation at large. Once the Metric Conversion Board is established, it too, will face a learning-curve and development of its own management program. The Board cannot prepare the details of the plan. The reason is obvious. If detailed planing is to be efficient, and if the changeover is to go through with the least possible friction and at the lowest cost possible, knowledge of individual firms and their customers across the nation is essential. Only the firms themselves have the knowledge. Conversely, no firm can act on its own. It needs to know what others in its sector including its suppliers and its customers, are doing, and it must have a timetable consistent with their needs. The individual firms will undoubtedly work with their associations and trade groups to prepare the detailed sector plans, which will be fed into the Metric Conversion Board as the coordinator of the overall program. Magnify a thousandfold the complexity of our industrial base and the criticality of the coordinating role becomes self-evident. This task—that of changing to metric—will be the largest coordination task in history for this country with the possible exception of the production coordination needed for a major World War.

LIFE OF THE BOARD

We agree with Working Draft No. 1 that the Board should cease to exist no later than 10 years after approval of a comprehensive plan to accomplish the changeover.

CHANNEL OF REPORTING FOR THE BOARD

Depending upon the legislative draft one reads, two possible reporting channels for the Board have been suggested: (1) submission of the plan "to the Secretary of Commerce for transmittal with his recommendations" to the President and Congress, as in H.R. 11035 or, (2) "develop and submit to the President and the Congress" . . . as in Working Draft No. 1, S. 100. We favor the latter approach. Hopefully the Board will be comprised of some of the best intellects available in this country. Placing things into a chain of command wherein the final program must have the recommendations of a singular Departmental Secretary when, in fact, issues are involved affecting *all* federal departments and agencies and our total society in general, is unsound. We suggest and recomend that the Board report only to the President and the Congress.

ADDITIONAL RESPONSIBILITIES FOR THE BOARD

Inter-related with earlier comments, it appears advisable that the legislation spell out some additional specific responsibilities for the Board to be included in their final program plan:

First, the Board should be required, after consultation with the Department of Justice, to establish rules of procedure governing participating companies in their activities in informing and advising the Board in the planning for, and implementation of, the conversion, and in the possible reduction of unnecessary product variety. In this way, an intent of Congress would be manifested that such activities of companies undertaken under the auspices of the Board and in accordance with its rules of procedure are not intended to be subject to antitrust proceedings. A similar intent has already been expressed by the House under the heading "Antitrust Considerations" commmencing on page 16 of Committee Report 93–604 of the House Committee on Science and Astronautics. In furtherance of this intent, Section 10b of H.R. 11035 requires the Board to provide procedures for industry participation.

Second, the Board should determine the length of the overall timetable for the nation rather than the current emphasis that proposes a 10-year schedule. Until the Board completes its planning effort no one knows clearly how good the 10-year figure really is.

FEDERAL AGENCY CONVERSION PROGRAM AND FEDERAL PURCHASES

Here again, depending upon the legislative proposals one reviews, you find variations. We recommend to the Committee that all federal agencies and departments be treated as customer *participants* in the development of the coordinated national conversion plan. By this we mean their efforts should be dovetailed with the industry sectors closest to them rather than acting independently. The concept of fostering faster moves into metrication by the use of federal purchasing power with possible disregard of society's overall planning efforts in unconscionable use of governmental power. Misuse of governmental power along these lines in a society in which the rights of the individual are paramount will create transitional injuries despite the fact that the general program is in the national interest. If this occurs, the government may well find itself flooded with demands for subsidies inasmuch as the government itself will have created the problem. In this light we recommend to the Committee that any final legislation delete in its entirety any reference (such as Sections 3, (6) and (7) of Working Draft No. 1, S. 100) to governmental agency action or potential action which may create the impression that the agencies may act other than as *equal participants* in plan development and implementation. This also requires deletion of any language suggesting that the power of the federal purchasing dollar be used as a lever to accelerate the changeover.

TAX ASSISTANCE, SUBSIDIES, CONVERSION ASSISTANCE

It is the established policy of the NAM that the costs of conversion should lie where they fall. We have a positive position clearly against subsidies. It formulating their programs with the National Metric Conversion Board, each sector of our economy should select the most efficient cost/benefit approach. The Committee has undoubtedly read and heard about massive costs for conversion. We have seen reports which estimate the cost to the nation running from $10-billion to $100-billion. The truth of the matter is that no one really knows what the cost will be. However, there will be little incentive to look for thoughtful, low-cost solutions if subsidies are made available, and bureaucratic processing of the subsidies will add further to the costs, which the taxpayer must ultimately bear. We should rely upon the ingenuity of the American people to find ways of circumventing the costs of conversion.

We recommend that the Committee seriously consider the feasibility of assigning to the Board the responsibility to report to the President and the Congress on any potential or recognized transitional injury area and to suggest what form of possible government assistant other than outright subsidy might be warranted.

NATIONAL ASSOCIATION OF MANUFACTURERS,
BOARD OF DIRECTORS MEETING,
BOCA RATON HOTEL & CLUB,
Boca Raton, Fla., February 13–14, 1973.

Committee: Marketing.
Chairman: Edmund T. Pratt, Jr., chairman and chief executive officer, Pfizer, Inc.
Subject: Metric transition by the United States.
Committee recommendation: New policy position.

POLICY LANGUAGE

The National Association of Manufacturers believes that the long-term interests of the United States will be best served by adoption of the International System of Units (SI) and thus be in total harmony with the rest of the industrial and commercial world.

The NAM further believes that industry should participate in and support the development of standards that may be required by such adoption.

In the adoption of the international system of units (SI) the following are paramount:

(A) That the international system of units (SI) be adopted as the primary system without exclusion of the customary system.

(B) That the adoption be voluntary and based upon each industry's assessment of all factors involved.

(C) That there be established a national metric conversion board with the authority to develop a coordinated national transition in concert with all sectors of our society and formulated before the program is to be executed.

(D) That the national metric conversion board have no mandatory authority with respect to implementation of the plan.

(E) That the national metric conversion board establish a target completion date and that any implementation period in the coordinated national plan be a goal rather than a mandatory requirement.

(F) That the costs incurred in the changeover shall lie where they fall.

(G) That the government establish appropriate administrative procedures by which industry sectors may obtain guidance concerning the extent to which cooperative efforts in planning transition tables and related matters in planning transition tables and related matters are consistent with the anitrust laws of the United States.

(H) That the federal procurement process should not be utilized to force the pace of transition.

(I) That the government promote the use of the international system of units (SI) throughout the formal education system and with the public at-large.

SPECIFIC SUPPORTING COMMENTS ON POLICY POSITION FOLLOW BACKGROUND

Background

On January 10, 1973 NAM's Marketing Committee Task Force on Metrication and Standardization met and developed a recommended policy statement for approval by this Board. Due to the urgency for approval prior to planned hearings in Congress, this policy was submitted to the Marketing Committee for an emergency mail vote. The response via ballots from the Marketing Committee was overwhelmingly in favor of approval. No clearly "anti" vote was registered, and, in fact, the only negative response element questioned our "voluntary" rather than "mandatory" conversion approach.

I. Chronological record of past NAM activities:

June 1969—*Staff liaison named to Task Force of ANSI* (American National Standards Institute).

July 1971—A *survey of NAM membership* was conducted by the Marketing Committee to gather effective data and membership opinion order to determine this Association's course of action. The results clearly indicated that NAM members favored a metric action program.

September 1972—*NAM staff named to ANSI's Metric Planning and Coordination Council.*

October 1972—NAM Marketing Committee Conference featuring top representatives from government, as well as industry. *Metric Conversion—Problems and Solutions*—was the featured subject area.

October 1972—*One thousand NAM companies were asked to designate a "metric coordinator."* Four hundred seventy five have named such a person, and responses are still coming in. The "coordinator" will be the company's focal point to receive information provided by the NAM on this complex subject and also to give *us* feedback.

A series of articles was written for *NAM Reports.* We are currently developing a series of publications to provide guidance for NAM membership and national trade associations.

II. Current status of metric legislation:

In August, 1972 the Senate passed legislation providing for U.S. adoption of the metric-SI system as the primary system of measurement for the nation. No action taken by the House last session. However, we believe that complementary legislation will be pursued in the House early in this session, and it is our opinion that the bill will pass without delay.

We believe that the transition will be voluntary since the bills call for the creation of a National Metric Conversion Board to develop a transition plan. The master plan for national transition is expected to take a minimum of 12 months and a maximum of 18 to prepare. The target for general transition is 10 years.

The Conversion Board will work with all sectors in the plans development with heavy activity aimed at industry trade groups and national associations to come up with required sector timetables and industry technical standards changes.

CONCLUSION

The Marketing Committee believes that the recommended policy should be adopted by this Board in order to enable the Association to forcefully express its views before the appropriate Congressional committees, and following, assume an active continuous role in the transition planning for a metric changeover.

Supporting Comments

These comments are designed to provide further background information on the specific sections of the recommended policy position.

1. Opening statement.—The results of a three-year national survey by the Department of Commerce clearly indicate that over 70 percent of manufacturers believe it is in our long-term national interest to adopt the metric-SI system.

Inasmuch as metric-SI is more than merely a change in how we express things, but also affects technical standards, it is essential that industry step up its standards-development activity. Without revised standards any effective metric transition would be extremely difficult. The second paragraph covers the need for NAM to participate in legislative activities involving the U.S. government increasing its role in standards-development activity internationally.

2. Specific comments.—A. Proposed legislation suggests two possibilities: (i) metric-SI becomes our only legal system; (ii) it becomes our primary system (without exclusion to use of customary system). NAM's Task Force chose the latter for multiple reasons, some of which were: (1) there are areas where no benefit would arise from a change; (2) in other areas conversion costs would be prohibitive; (3) the Task Force believes that the adoption of SI without exclusion of the customary system is the most logical course to pursue.

B. The Task Force believes that the best interests of the nation and industry will be achieved through a voluntary conversion program wherein each industry sector participates in standards development and timetable planning, and assesses its own needs and cost/benefits involved.

C. Industry recognizes that without a central coordinating body, no such program could ever proceed successfully—thus the Task Force endorses the need for a Metric Conversion Board. The Task Force also recognizes the importance of the membership of this Board, and that they be highly qualified and come from all sectors of our society. The Task Force believes that NAM, in our own self-interest, must recommend candidates from industry to the White House and the Congress.

D. With a voluntary transition the Task Force believes that the Board should not require mandatory authority.

E. Current legislative approaches call for a 10-year transition period. It is not certain whether this approach is a mandate. NAM believes that there can be no sudden overnight transition to the metric system. It has to be a gradual process, and for a highly-industrialized country, 10 years is clearly a minimum time. The Task Force also believes that until the Metric Conversion Board and industry sectors formulate their respective transition plans it is extremely difficult to arrive at an advanced timetable. Thus, accepting the 10-year date as a goal, but recognizing that in some areas it would not be achievable, was the intent of this paragraph.

F. The question of costs is a major one. Generally, the Task Force felt that any government subsidy with respect to costs incurred in *any* sector—education, consumer, or industry—should be avoided. Experience in Japan, the U.K., Australia, New Zealand—which have undergone recent transitional efforts of magnitude—suggests that the costs must "lie where they fall" and that the long-term benefits outweigh costs incurred.

G. It is obvious that when industry sectors talk of revising product standards, eliminating certain lines, and arriving at a transition timetable, antitrust laws and regulations are being breached. This has been a problem in other countries, and some form of arbitration procedure appears warranted. Past experience suggests that an outright exemption was impossible and that the arbitration approach is the least controversial.

H. Some of the legislation clearly supports the use of federal purchasing power to move industry faster into metrics. This has been done in the U.K. NAM's Task Force believes that the government should make its transition timetable and plans interweave with those set by the industry sectors themselves in concert with the Metric Conversion Board.

I. The last statement is self-explanatory—the re-education of older people and new standards is a major effort. It is one element that can be implemented immediately, and the initial efforts should precede industry's moves.

○